[From Vallesius: Hippocratus, Coloniae, 1589.]

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JOHN SYNG DORSEY*

(1783–1818)

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MADISON, WISCONSIN

DIED, Yesterday, at about 10 o'clock, Dr. John Syng Dorsey, Professor of Anatomy in the University of Pennsylvania. In this melancholy event, Society has to regret one of its most distinguished ornaments, and the Medical College of our City has been shorn of one of its brightest beams.

Ardent in the pursuit of Science, yet ever gay and affable in social intercourse, no one elicited as a Philosopher, more profound respect, or as a companion, more sincere attachment. He had just appeared with universal applause, as the successor of our lamented Wistar, and gave to those who witnessed his first effort in the station, unequivocal evidence of genius and erudition, more than adequate to the task he had undertaken. Young, laborious, and brilliant, the prospect of future usefulness to his species, of honor to his friends, and of reputation to himself, was almost boundless.—It has been suddenly and irreparably blasted.—He has left a widow and three children, who amid the general gloom, can only be considered as the chief mourners for his loss.[1]

This obituary marked the passing of one of the most remarkable figures in the medical history of Philadelphia. Stricken in his thirty-fifth year, by his brilliant record of accomplishment he had given promise of preeminence in his chosen field. In certain respects Dorsey's brief but glorious career may be likened to the lives of Bichat, Laennec and the young James Jackson. At twenty-two years of age Dorsey had written the following lines, which were to prove singularly prophetic of his own life:

'Tis so with man;—he rises from the womb,
Then shines a while, and sinks into the tomb.
Alas, how few who to their zenith rise,
And all their course pursue thro' cloudless skies.

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[1] *Franklin Gazette*, Phila., Nov. 13, 1818.

* Read before the University of Wisconsin Medical History Seminar, at the home of Dr. William Snow Miller.

John Syng Dorsey was born into the family of a successful Philadelphia merchant on December 23, 1783. The original D'Orseys had emigrated from England to Maryland and thence by reason of their Quaker adherence had moved to Pennsylvania. Such advantages as are supposed to accrue from affluence and high social station were his and to these were added the personal interest and material assistance of a distinguished maternal uncle, Philip Syng Physick. So closely interwoven were the professional lives of these kinsmen to become that a brief survey of Physick's status is essential to a comprehension of his influence upon the young nephew.

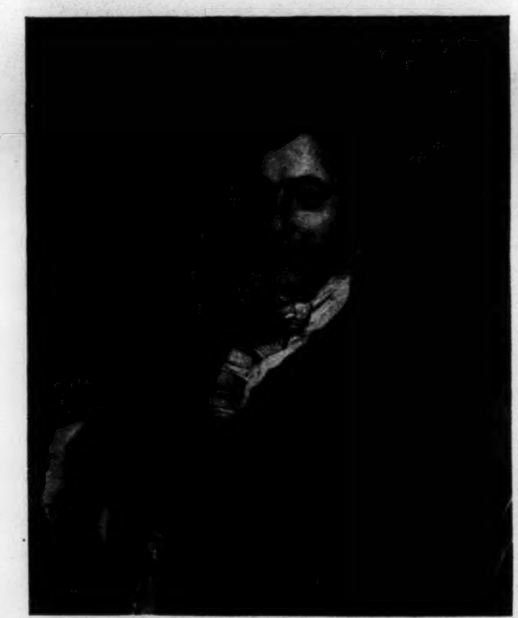


Fig. 1. Portrait John Syng Dorsey Inscribed; "As a Memorial of a Beloved Preceptor, This Portrait of the Late John Syng Dorsey, m.d., Professor of Anatomy in the University of Pennsylvania, Was Caused to Be Engraved by His Private Pupils."

By the time Dorsey had completed his preparatory course at the Friends' Academy in South Fourth Street, Physick had achieved an enviable position in the public notice through his unfailing devotion in the recurring pestilential visitations of yellow fever. Added to the moral advantage of a well-earned reputation for professional fidelity came an enviable friendship with Stephen Girard, a power in the business and shipping world of that day, a reciprocal working agreement with the incomparable Benjamin Rush and, best of all, an appointment to the Pennsylvania Hospital which afforded him an adequate outlet for his surgical training. Finally in 1800 the students at Pennsylvania petitioned Physick to deliver a series of surgical lectures to them and five years later he was made the first professor of surgery in that school. So outstanding were Physick's contributions to his chosen field that he came to be known as the Father of American Surgery.

As has been stated, John Syng Dorsey attended the Friends' Academy where a particular adeptness in the classics and a power of application beyond his years were remarked. At the tender age of fifteen he left the Academy for his uncle's office, where he began the study of medicine as a house-pupil. Fascinating records of this period of Dorsey's development, in the form of notebooks, are preserved in the Library of the College of Physicians. Especial interest in the present relation attaches to one of these which is inscribed "Notes from Cases of Surgery, which have occurr'd in the Practice of Dr. P. S. Physick." The title-page is embellished with its owner's signature in many hands and a sketch of a hydrocephalic head. Some thirty-odd cases are herein discussed. They cover a wide range of clinical diagnoses from cataract to stone; but a clear picture of each condition and its management is conveyed by the youthful note-taker.

The detail of his descriptions bespeaks a grasp far beyond his fifteen or sixteen years. Repeated reference is found to his uncle's consultations with Wistar, Rush, Shippen, and Dewees; and doubtless Dorsey availed himself of the golden opportunity to observe these masters and their methods in the intimacy of the sick-room. While the young lad assisted his uncle in his operations and accompanied him on his professional calls, it is not to be assumed that he escaped the tedium of the house-pupil of that period. Yet it is scarcely conceivable that Physick would require of his nephew such duties as S. Weir Mitchell outlines for the apprentice of an earlier generation in Philadelphia, who "carried medicines to the sick, or prepared drugs for use by his master in his daily rounds; made fires, kept the office clean, and did other less agreeable duties commonly devolving nowadays on servants." It would seem entirely fitting that Dorsey should have been subjected to the same ordeal of memorization of the medical classics that his master had experienced at the hands of Adam Kuhn. The mark of this training was later revealed in the young man's encyclopedic grasp of medical literature.

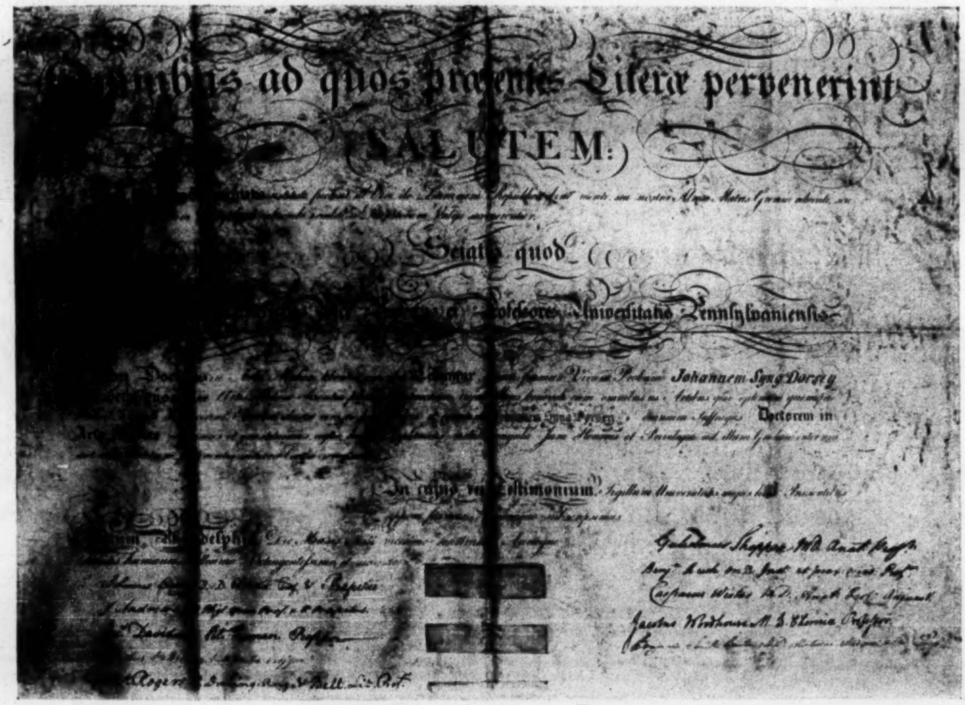


FIG. 2. DORSEY'S MEDICAL DIPLOMA.

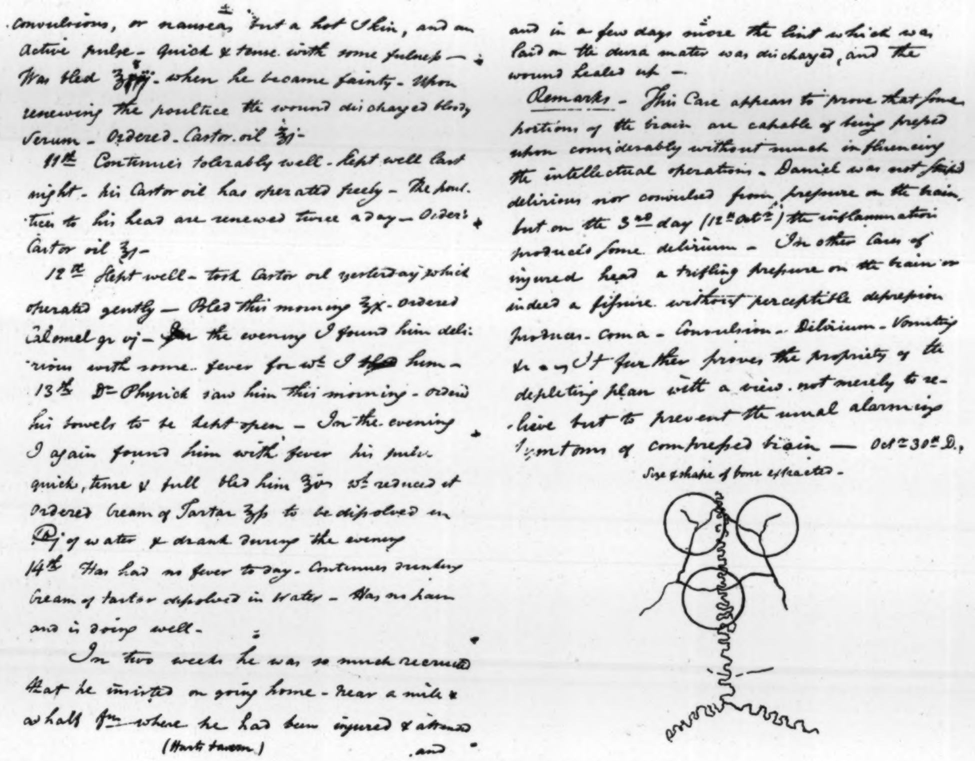
So assiduous was his application that he completed the requirements for the degree of doctor of medicine at Pennsylvania before he had reached nineteen years of age. The Trustees of the University set the majority rule aside in his favor and he graduated from that institution on May 27, 1802. His thesis, "An Essay on the Lithotriptic Virtue of Gastric Juice," was a commendable effort. True his inspiration had come from Physick and the thought of a solvent for vesical calculus had in no sense been original; but particular merit is demonstrated in the young essayist's attack upon the problem.

Subscribing to the origin of stone from the natural constituents of the urine, Dorsey discusses the mechanism of their formation and concludes a recital of their symptomatology by a statement that they "destroy every capacity of happiness, and render the patient's life, a burden to himself and a misfortune to his friends." Decrying surgery as a "proof of the imperfection of medicine," he declares "that the only rational prospect of success in curing this dreadful malady, consists in the possibility of dissolving the stone." Various solvents, carbonic acid, carbonated soda, lime water, soap, uva ursi, vegetable alkali saturated with carbonic acid or aqua mephitica alkalina, are discussed and he concludes that in spite of apparent assistance, "it is equally true, that in many instances where the palliation of the disease was supposed to result from its solution, dissection after death has detected its presence."

Intravesical injections of gastric juice had been advocated at various times by Spallanzani, Reynolds and Darwin, but doubtless Dorsey's interest had been directed to the subject by Physick's mention of such a possibility in the course of a lecture at the Pennsylvania Hospital. As early as 1792 his preceptor had enclosed a stone from the intestines of a horse in a silver sphere and had administered the same to a fasting dog. On examining the contents of the sphere passed by bowel Physick had determined that it was only a quarter of its original size. A vesical calculus had next been enclosed in a similar container and had been fed to a dog, but on recovery no change had been noted. With the same thought in mind Physick had fed a sponge to a hog several hours before it had been slaughtered, and into the gastric juice expressed from the recovered sponge he had introduced a stone recovered from the human bladder. Maintaining a temperature of 90° to 100°F. for four days, he had noted that the solid texture of the stone had given way to a reticular structure and on agitation it had completely disintegrated.

With this substantial background Dorsey repeated the steps of his uncle's experiment with certain important modifications. A silver sphere with numerous perforations containing a vesical calculus was swallowed by a healthy man. After sixty-five hours this sphere was recovered in the stools and the stone was found reduced in weight from 7 grains to 5 grains. Then, too, the remainder of the calculus was considerably softened. Next, the gastric juice of a dog was determined to effect a decided increase in the friability of stone. A similar change in the consistency of stone occurred upon submersion in the gastric juice of a hog, and the considerable loss in the weight ot stones so treated led Dorsey to the opinion that the solvent power of the gastric juice of the hog was greater than that of the dog. Interestingly he concluded that there was serious doubt as to whether the gastric juice actually dissolved the calcareous matter, but rather he felt that the mucinous or other binding substance was brought into solution. Always he noted the presence of sand-like particles in the bottom of the phials in which the experiments were conducted. Furthermore, the strained and filtered gastric juice used in the tests was not acid to litmus and in taste was salty or bitter rather than acidulous.

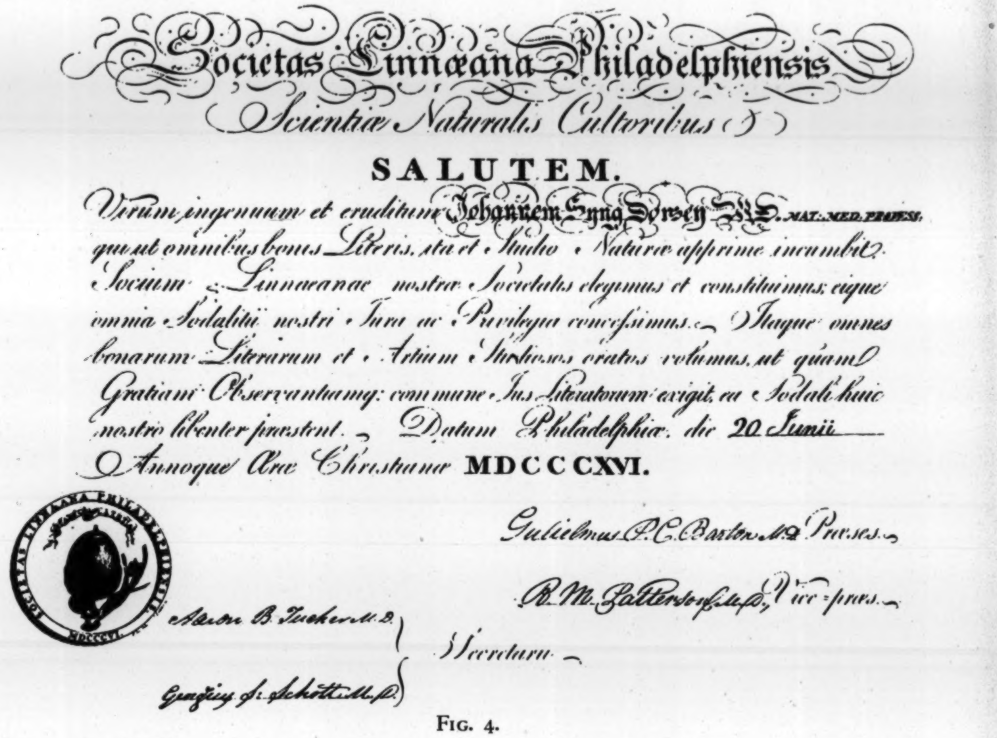
With full courage born of conviction Dorsey introduced 2 oz. of the gastric juice of the hog into the human bladder without an immediate sense of discomfort or pain. After three hours 16 oz. of a very turbid fluid was passed. The same evening the subject experienced a severe chill. Undeterred by this circumstance Dorsey treated a patient, who presented the picture of vesical calculus and who refused operation, by daily injections of 4 oz. of hog's gastric juice. On the first day, after an hour had elapsed following the injection, a coffee colored urine with mucus was passed. After the same interval on the second day a very turbid urine resulted. From the third to the eighth days, inclusive, definite sand was determined in the urine after each injection. It seems probable from the report that injections were discontinued at this time because of the development of discomfort and strangury. On the tenth day an isolated injection was given and thereafter an interval of control elapsed during which time there was observed no sand in the urine. On the fifteenth day the injections were resumed and importantly there was a reappearance of sand in the urine. For two weeks longer daily injections were made. No reason is given for the termination of therapy at the end of this period; but it is stated that the patient experienced a painful paroxysm without voiding calcareous matter. In his summary Dorsey reaffirms the solvent action of the gastric juices of several



convulsions, or nausea, but a hot skin, and an
active pulse - quick & tense with some fulness -
Was bled ℥viij - when he became fainty - Upon
renewing the poultice the wound discharged bloody
serum - Ordered - Castor oil ℥j -
11th Continues tolerably well - slept well last
night - his Castor oil has operated freely - The poul-
tices to his head are renewed twice a day - Orders
Castor oil ℥j -
12th Slept well - took Castor oil yesterday which
operated gently - Bled this morning ℥x - Ordered
Calomel gr vj - In the evening I found him deli-
rious with some fever for wh I bled him -
13th Dr Physick saw him this morning - ordered
his bowels to be kept open - In the evening
I again found him with fever his pulse
quick, tense & full bled him ℥vi wh reduced it
Ordered Cream of Tartar ℥ss to be dissolved in
Oj of water & drank during the evening
14th Has had no fever to day - Continues drinking
Cream of tartar dissolved in Water - Has no pain
and is doing well -
In two weeks he was so much recruited
that he insisted on going home - near a mile &
a half fm where he had been injured & attended
(Harts tavern) and

and in a few days more the lint which was
laid on the dura mater was discharged, and the
wound healed up -
Remarks - This Case appears to prove that some
portions of the brain are capable of being pressed
upon considerably without much influencing
the intellectual operations - Daniel was not stupid
delirious nor convulsed from pressure on the brain,
but on the 3rd day (12th Octr) the inflammation
produced some delirium - In other Cases of
injured head a trifling pressure on the brain or
indeed a fissure without perceptible depression
produces - Coma - Convulsion - Delirium - Vomiting
&c &c - It further proves the propriety of the
depleting plan with a view not merely to re-
lieve but to prevent the usual alarming
symptoms of compressed brain — Octr 30th D.,
Size & shape of bone extracted -

FIG. 3. PAGES FROM A NOTE-BOOK, 180-102.



Societas Linnæana Philadelphiensis
Scientiæ Naturalis Cultoribus S.

SALUTEM.

Virum ingenuum et eruditum Johannem Syng Dorsey M.D. NAT: MED: PROFESS. qui ut omnibus bonis Literis, ita et Studio Naturæ apprime incumbit Socium Linnæanae nostræ Societatis elegimus et constituimus; eique omnia Sodalitii nostri Jura ac Privilegia concessimus. Itaque omnes bonarum Literarum et Artium Studiosos oratos volumus, ut quam Gratiam Observantiamq: commune Jus Literatorum exigit, ea Sodali huic nostro libenter præstent. Datum Philadelphiæ. die 20 Junii Annoque Æræ Christianæ MDCCCXVI.

MDCCCVI

Gulielmus P. C. Barton M.D. Præses.

R. M. Patterson M.D. Vice-pres.

Aaron B. Tucker M.D.
Georgius S. Schott M.D.
Secretarii

FIG. 4.

animals, especially the hog, upon vesical calculi and suggests that an enhanced property in this direction might result if such animals were previously fed bone, tendon, cartilage and the like. He points out that a stone may by this means be sufficiently reduced in size to permit of its passage through the urethra. Although this essay was dedicated to Dorsey's kinsmen, Edmund and Philip Syng Physick, particular acknowledgment was made of Benjamin Rush's "friendly zeal for my improvement." The remarkable fecundity of Pennsylvania in research at this period has been the subject of considerable study and conjecture, and the association of Rush's name in the above relation may indicate that he was the catalyst.

The companionship of stimulating thinkers was early sought by Dorsey. His membership certificate in the Philadelphia Medical Society is dated 1801 and was signed by Benjamin Rush. Another interesting document is Dorsey's diploma from the Chemical Society of Philadelphia, which "desirous of promoting the cultivation of the Science of Chemistry in the United States of America, by associating with themselves persons of distinguished talents, have elected John Syng Dorsey a member of the said Society, hereby granting him all the privileges thereunto belonging." A certificate from the Pennsylvania Hospital (1802) and signed by Samuel Coates and Lawrence Seekeb, sitting managers, and Benjamin Rush and Philip Syng Physick, attending physicians, remarks that "he hath attended the Practice of the Physicians of the said Hospital for four years."

The recurrence of yellow fever in 1802 afforded Dorsey an excellent opportunity for first-hand information concerning a disease which had proved the most important factor in changing the commercial destinies of the rival seaports, Philadelphia and New York. With the diversion of trade to the latter because of the repeated epidemics in the former, Philadelphians naturally had an added impetus in their efforts to eradicate the disease, if such as incentive had really been required to arouse the public interest in the dangers of so dire a threat to health and life. Dorsey, following the example of his illustrious uncle, volunteered as a resident in the city hospital. Here also he made careful bedside notes of his observations and, as his uncle before him, conducted post-mortem examinations whenever the opportunity presented itself. Certain biographers credit Dorsey with the original demonstration of the non-contagiousness of yellow fever; but to mention only the Philadelphians for whom priority in this respect has been claimed, Caldwell, Physick and Rush take precedence. Caldwell claimed to have converted Rush to this viewpoint and Physick certainly by precept and example supported a similar opinion. It is enough then to hold that, through what was still deemed reckless exposure by his skeptical confreres, Dorsey gave further weight to a growing belief in the non-contagiousness of yellow fever.

Dorsey's immaturity closed the field of general practice to him temporarily. So he wisely determined to follow his uncle's example further by a period of English and continental study. After a trying passage he landed in England December 31, 1803. Letters of introduction gave him entree to representative homes in London. His equanimity was rudely shocked on learning that his expenses for instruction at St. George's Hospital would greatly exceed his anticipations. A rather flattering visit from the venerable Doctor Lettsom, who sought the assistance of Dorsey's recent experience in the yellow fever epidemic for the preparation of a paper, marked the early days of his London stay. Available references give no inkling of the utilization by Lettsom of such information as he may have gathered from Dorsey; but that the latter's courtesy was appreciated was evidenced by an invitation to attend a rather sumptuous supper given by Dr. Lettsom to some five hundred guests at his country place near London. Of this affair Dorsey wrote, "The chattering of the ladies pleased me much better than a lecture of an hour on an eclipse, an Egyptian mummy, a rusty medal or the horizontal parallax."

Spalding errs in affording Dorsey the privilege of "most friendly terms with John Hunter." The master had been dead for ten years when Dorsey first set foot on English soil; but the Everard Homes, related by marriage to John Hunter, apparently gave liberally of their hospitality to the young American, and his gratitude is marked in the frequent references of his letters to their kindness.

> Home continues to treat me very kindly. He lately introduced me to Sir Joseph Banks at one of his converzationes, which are held every Sunday evening, and are attended by all the literati of London. He has given me his ticket of admission to the Royal Institution for the season, where I hear chemical lectures in the evening, and where a vast number of ladies and gentlemen, and Nobles collect to listen to Mr. Davy and other lecturers.

Nor were his new British friends unmindful of the cultivation of his social graces, as witnesses the following:

> His wife (Mrs. Home) gives me occasional lessons of great use to my manners, always at my particular request. She is extremely etiquettical, and I am always making some awkward blunders; for instance in handling Miss Thomson, her daughter, out of the carriage, I landed her in the gutter. She asked me to accompany them to the theatre, and we were seated in the stage-box, I went without a cocked-hat, because I had none, and Nicholson's, which I commonly use on such occasions, was locked up, and he from home. We dined on turbot some days ago and I unluckily asked Mrs. Home for some sole! Last week, I dined there with stockings of a nankeen color, which are very dashing, and I thought I was quite stylish; Mr. Home insisted that I had on Mrs. St. Leger's stockings, one of the Covent Garden performers. But all these are great lessons, and I shall never again sport yellow stockings at Mr. Home's.

In his professional contacts Dorsey felt a greater sense of adequacy and indeed was prone to draw invidious comparison between the surgery of England and that of America. "Home let me into a wonderful secret to-day, which is that, in operating on the eye, we should always wait till it becomes fixed. This Dr. Physick has taught his pupils these five years. Home thinks that in one of a hundred cases the artificial pupil may succeed. I saw it succeed in three cases out of three." Dorsey adjudged Home and Cooper the only real surgeons in London and in general placed American surgery above that of Britain. Fortunately Dorsey was spared a knowledge of the perfidious behavior of his patron, Sir Everard Home, "who consigned himself to oblivion by burning Hunter's manuscripts after using them as the groundwork for sundry Croonian lectures and other alleged scientific contributions of his devising." Dorsey also attended the courses at William Hunter's Theatre of Anatomy, and his certificate of May 19, 1804 was signed by James Wilson and W. Leigh Thomas. The young American's work absorbed a greater part of his time and the future was to prove that his rather provincial attitude had in no sense closed his eyes to the educational advantage of his foreign contacts.

Early in the summer he left his new friends and acquaintances in London to complete his studies on the continent. Travelling by way of Holland he arrived in Paris on June 30, 1804. By chance one of his earliest acquaintances here was Dr. Guillotine, an old friend of Benjamin Franklin's. Contrary to popular belief, Dorsey found Dr. Guillotine a venerable and interesting gentleman. In Paris the social life was less distracting to Dorsey than had been the case in London, if his outline of the days' work serve as an index.

> I go to the Ecole de Médecine which contains a fine library and an extensive museum, three days in the week, to read: it is open on Mondays, Wednesdays and Fridays, from 10 to 2 o'clock. On the intermediate days, I go at 10 to the Hospice de L'Ecole de Médecine. This was formerly a nunnery, but the building is now applied to a better purpose. I prefer this hospital, not from hearsay, but because I am convinced that all that can be learned from the French is the operative and mechanical part of surgery, and Dubois, who operates here, is confessedly the first in that department. I have taken notes of his operations, which I shall carry home. The number of pa-

tients in this hospital is small compared with that of Hôtel Dieu.

His boundless enthusiasm is witnessed by the eagerness with which he availed himself of the privilege Boyer, surgeon-in-chief of La Charité, had secured for him to dissect at the Salle de Repos. "I have succeeded at last in dissecting the ear. It was two Sundays ago I was to have seen a most splendid review by the Emperor, but as I was fortunate enough to trace the origin and insertion of the stapedius and tensor tympani, and to show all the cavities of the ear very completely, I was so delighted as to forego the splendor of the scene in the Tuileries for that in the Salle de Repos."

Dorsey's judgment of the French surgeons was even less flattering than his opinion of the English. He was appalled by their lack of ordinary cleanliness, inadequate after-care, and the fact that they

> . . . seldom save skin enough . . . But of all the cruel operations I ever witnessed, I never saw one which gave me more pain than one performed by Dubois for the cure of tic douloureux. It consisted in applying a piece of dry moxa to the most painful part of the face. This was set on fire, and suffered to burn to ashes, in spite of all the patient's agony. How he could submit to it I cannot conceive. I really thought the bust of old Ambrose Paré, which was directly over his head, frowned with indignation at the cruelty. The reason assigned for not using the caustic is that the slough will be deeper.

Gross expressed amazement at Dorsey's failure to comment on the work of Sabatier, Dupuytren and Pelletan; but apparently the American student was content with attendance upon the clinics of Boyer and Dubois.

In the fall (October) of 1804 he returned to America. The prestige of his foreign training bore little early fruit in financial return from practice in that Dorsey's income for the first year was $325.75. Abetted by $100 for attendance upon a patient of Physick's in Baltimore, $50 from private pupils and $45 from the sale of catheters, his income from the second year's work amounted to $924. During these lean years Dorsey frequently assisted Physick in his surgical work; he carefully recorded his interesting cases; and finally he attended medical meetings very regularly. Charity has profited in all times and places by the lack of occupation of young medical men. In 1805 Dorsey was appointed to the staff of the Alms House and served in this capacity until 1811. A second period of service in this institution lasted only one year, 1814–5. In the records of the Pennsylvania Hospital it is noted that "in 1807 the Medical Staff recommended the appointment of 'Two Medical Gentlemen to visit all poor patients laboring under disease who may apply for assistance, and that their prescriptions be made up at the Hospital.'" This plan was adopted and Nathanial Chapman was assigned to the southern district of the city while to Dorsey fell the northern district. This service was eventually discontinued in 1818 on the establishment of two new dispensaries in the Northern Liberties and Southwark.

A most important appointment was granted Dorsey in 1807 in response to the following communication:

> To the Trustees of the University of Pennsylvania
>
> Gentlemen; In consequence of being afflicted with an infirm state of health and thereby sometimes rendered unable without much suffering to fulfill the duties of my professorship of Surgery with punctuality I am under the necessity of requesting that you would do me the

> favor of appointing my nephew Dr. John Syng Dorsey to assist me in the Capacity of a Colleague or Adjunct Professor—In favor of his qualifications for that Station I shall only add (without saying anything of his talents) that he has been my assistant in the Surgical part of my business for nearly ten years and that I have the fullest confidence in deriving all that assistance from him which my bad state of health and frequent indisposition require.
>
> Dr. Dorsey does not expect to attend the meetings of the Medical faculty or examinations of candidates for degrees. Of course the expense of graduation will not be increased.

At the time of his appointment to this important post, October 14, 1807, Dorsey was twenty-four years old. Lyman Spalding who with his wife spent three months in the winter of 1809–10 in Philadelphia noted that:

> To their great delight socially and medically, Dr. Dorsey always walked the Wards with his uncle, Dr. Physick, often stood on the platform whilst other lectures were going on, and occasionally gave us a lecture of his own. His talk on Bronchotomy was clever. 'In penetrating wounds, apply the dressing so that it cannot fall into the cavity.' In a gunshot wound of the thorax he bled the patient to 180 ounces, in twelve days yet he made a good recovery. A bayonet wound of the abdomen was fatal, because in Dr. Dorsey's opinion, the liquor which the patient had just then been drinking had run into the abdominal cavity.

His success as a teacher was early assured. Personally attractive and popular he bent every effort in the pursuit of his duties. An early difficulty in articulation gave way to a clarity of public address. With this improvement came a composure and dignity which contrasted with his earlier confusion. His uncle's assurance of the nephew's worthiness was borne out by the latter's faithful attendance to duty in his elder's enforced absences by reason of ill-health. Dorsey's industry and enthusiasm were in turn rewarded by a growing confidence and respect inspired in the student body and the profession at large. His self-assurance grew apace until as Gross records, "Rich in knowledge, eminently self-possessed, and fertile in resources, aided by a retentive memory and a fluent elocution, there were few men among Dorsey's contemporaries, who could successfully cope with him in debate, or in the systematic discussion of a professional topic." Of this phase his personal friend and advocate, Nathaniel Chapman, thus spoke in eulogy:

> The style of his speaking was peculiar and distinctive. Destitute of rhetorical pretensions, it had the character of warm and elevated conversation, and while it was sufficiently strong to cope with the most powerful, it was intelligible by its simplicity to the meanest capacity. Equally adroit in attack or defense, the resources he exhibited in these contests, and especially when pressed by the weight of an adversary, were surprising, and often drew forth strong expressions of admiration and applause.

Professional felicity was held at a high premium in that day, as the following letter from Dorsey to Lyman Spalding indicates:

> Philadelphia, 6th August 1810. Dear Sir: After so long neglecting to reply to your favor of 22nd of May, you may perhaps suppose that I have forgotten it. This I beg to assure you is not the case. An unavoidable occurrence prevented me from sending the plaster in time for your messenger, who left the town the day after I received your letter. Since that time I have had no opportunity of forwarding it until the present which I hope will prove a safe and speedy one. The

'Antimonial Powders' are prepared in such a variety of ways, that I know not, without particular instructions, how to order them. If you will take the trouble to specify the formula, I will have them forwarded to you as soon as an opportunity offers. I rejoice to learn of your success in the operations you have performed; may it ever continue. Accept my thanks for the Bill of Mortality you were kind enough to send me, and believe me, very respectfully your friend, J. S. Dorsey.

Nor was Dorsey's charm limited to his professional contacts. When so diverted he could be a social lion. In such convivial moods he was a most fascinating companion. He played several musical instruments acceptably. In person he was quite handsome. Of medium height his figure became rather portly in the last few years of his life. A prominent nose, full lips, rounded chin, and a high broad forehead mark the Sully portrait of him which is said to be a trustworthy likeness. Sparkling blue eyes and a riotous mop of brown hair which in conscious undress fell over his collar, complete a study that to this day arrests the attention of even the most casual.

Mention has been made of his worship of the muse. The few examples of his art spared to posterity appeared in The Portfolio. A pensive ponderous effort, "Reflection on the Incomprehensibility of God," is in strange contrast to the light strain of the following doggerel:

With Rush I like bleeding, because I am sure
There are fifty diseases the lancet will cure,
But the tapping a vein I'd with pleasure resign
For the pleasure of tapping a hogshead of wine.

The meetings of the Philadelphia Medical Society at one of which this verse was recited, were apparently convivial occasions in that day.

In 1807 Dorsey married Maria Ralston, the cultured daughter of a wealthy merchant of Philadelphia.

Two lines I write;—enough to prove
That writing less than thee I love.

To these his son Robert Ralston added a number of years later:

And I must make your two lines four
By wishing you'd loved writing more.

Three children were born to this union. Fortune favored them and a new home overlooking what is now Washington Square was occupied by the Dorseys. The paltry income of the doctor's early years of practice steadily increased to reach $10,199 in 1817. The fees from private pupils and the income from textbooks by this time constituted an important factor in the improved finances of the family.

Prior to this time a short text by John Jones,[2] had constituted the only American surgery. In 1813 Dorsey published his "Elements of Surgery" in two volumes. Meeting the real need of a surgical textbook in English it was an immediate and unqualified success. It was universally used in America and widely accepted in Great Britain. Indeed in Edinburgh it was early reprinted and served as the standard text in the University. As Gross has pointed out its success was in no small measure due to the knowledge that it represented the respected opinion of Philip Syng Physick, whose peculiar repression had denied to the profession the benefit of his vast experience and superior judgment through the medical literature. True as was this analysis, a considerable importance attaches to Dorsey's familiarity with English and French sources. Dorsey remarked, "The American surgeon is or ought to be strictly impartial and therefore adopts from all nations their respective improvements." In this acknowledgment of assistance from Hunter, Bell, Desault, Boyer, and other foreign sources Dorsey had outgrown the provincialism of his European correspondence. The text itself was written with a thought of its availability to students. The style is simple and direct. The subject matter on the whole is easy of comprehension. Conservatism is his keynote. "What the surgeon cannot cure he removes by his knife. If his art were perfect he would never amputate, but in the present state of medical science even this terrible operation is occasionally demanded": this quotation from the text characterizes Dorsey's attitude. The plates were largely designed and engraved by the author himself and constitute a tribute to his skill as a draughtsman. The book passed through three large editions and then was superseded by newer texts. In 1887 Ashhurst said of it, "a work, though of course, in no way comparable in erudition and elaboration with the voluminous treatises of the present day, was, I venture to say, for its time, no less creditable to its author and his country than have been any of its successors." A student of an earlier period, Charles D. Meigs, wrote:

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[2] JONES, J. Plain, Concise, Practical Remarks on the Treatment of Wounds, and Fractures. N. Y., 1775.

> Whoever will read Dorsey's Surgery will learn what it was that common sense said in those times in the art of surgery. Though we have not the least doubt or lack of faith in the great progress of medicine in all its branches in the nineteenth century, must we first say *risum teneatis amici* before we venture to add that we early received Dorsey's Surgery as a man takes his wife, for better, for worse, in sickness, and in health, until death doth us part; and though our golden wedding is already past and gone, that we adhere to our engagement then and there.

It must not be assumed that Dorsey spoke without authority. For fifteen years he had pursued the study and the practice of medicine. A major portion of this time he had passed as assistant to his uncle, the greatest living American surgeon. His training had been further enhanced by contact with the best European surgeons. From May 7, 1810 he had served on the staff of the Pennsylvania Hospital. It is not hyperbolic then to join Gross in the statement that except for Physick in Philadelphia and Post in New York, Dorsey was without a surgical rival in America. A brilliant operator, conservative but fearless, was Gross' estimate. In *The Eclectic Repertory and Analytical Review for* 1811, he reported a case of inguinal aneurysm cured by ligation of the external iliac artery. In England Abernethy had anticipated him after two unsuccessful attempts. Dorsey utilized Physick's device for passing ligatures beneath deeply placed vessels and was the first American surgeon to report such a case. He was not only an able assistant to his uncle at the operation, but undoubtedly rendered invaluable aid to him in perfecting his many instruments. Physick refers directly to the cooperation of Hartshorne and Dorsey in testing various substances proposed for animal ligatures (1816).

Meigs has preserved an interesting professional encounter with Dorsey:

> One day while strolling along Ninth Street near the University buildings, I was overtaken by Professor Dorsey, who hooked arms with me and said, "Come along with me; I will show you a case." We entered a house in Market Street above Ninth, where in an upper room a man was lying on a bed, pale, breathing very slowly and perfectly insensible; his pulse was soft and infrequent and he

snored a little at times. "This man," said Dorsey, "fell from a scaffold, and has got a concussion of the brain. He has no fracture of the skull, and yet see how I am healing him. I have done nothing but wrap his head in this towel wrung out of cool water."

"Is that all that you are going to do for him, Doctor?"

"Yes, all for the present. Don't you remember what John Hunter said to Dr. Physick: 'Wait until he reacts, and then I shall bleed him,—of course, I will?'"

In that day the professor was an oracle and the practice of medicine was controlled by such confessions of faith.

The year 1813 marked yet a further advance for Dorsey in that he acceded to the chair of materia medica at the University. The death of Benjamin Smith Barton had vacated the professorship of the institutes and practice of physic and Nathaniel Chapman had been transferred from materia medica to fill this place. In turn Dorsey was advanced from his nominal faculty position to occupy the vacancy left by Chapman's promotion. In this relation he further improved his reputation until he was esteemed "an eloquent, ardent, most able teacher, a gentleman most popular in the Hospital and the school alike." Within a short time he published a "Syllabus of his Course of Lectures" after the fashion of teachers of that day. It held the usual place of such ephemeral contributions devised, as it was, merely for student consumption.

Dorsey was rapidly becoming a force in the medical world. Professional appointments had given him every opportunity for advancement. Physick was gradually withdrawing from active practice; and as he narrowed his own activities, he extended the sphere of influence of his nephew. Unquestionably the growth of this favored kinsman was the crowning glory of his illustrious life. With Dorsey's advance came increasing responsibilities. Ever active in the affairs of the societies with which he was affiliated, by 1818 Dorsey had become secretary of the American Philosophical Society and vice-president of the Philadelphia Medical Society. A concrete example of his catholicity of interests is to be found in his participation in the proceedings of the Linnean Society of Philadelphia. The feud over the origin of yellow fever which found Physick aligned with Rush, still smouldered; hence Dorsey, ever loyal to his uncle, was not a fellow of the College of Physicians.

The apex of this meteoric career was reached in his appointment May 5, 1818 to fill the chair of anatomy, which the death of the gregarious Wistar had vacated earlier in the year. The problem of the Trustees of the University in selecting a worthy successor to Wistar was not an easy one. Many able men were available for the place and medical politics were active in their support. Yet Charles Caldwell in a letter of March 3, 1818 to Lyman Spalding, who was a candidate for the position, thus expressed the situation, "Dorsey will, I apprehend, ask for the chair of Anatomy. If so, all competition may cease. He will certainly carry it from any competitor. It would afford me pleasure to serve your interest in that or any other respect. But where there is no chance of success, it would be uncandid in me to offer any encouragement."

The following letter from Jonathan Horwitz to Spalding led to charges of duplicity on Caldwell's part:

> Philadelphia, March 2, 1818, D'r Sir: I have made all inquiries and the following are the results. Dr. Dorsey has

> finished the course of the deceased Dr. Wistar. He pretends not to desire the Chair of Anatomy being now possessor of the Mat. Med.; which I presume he intends to fill until the death of his Uncle, Dr. Physick, when in all probability, he has an eye to the Professorship of Surgery, being more congenial to his pursuits. But exerts himself much, and makes strong interest in favor of a Dr. Smith, now President of a College in Virginia. Drs. Hartshorn and Hewson, I understand are also candidates for the professorship: I have several times called on some of the Trustees, but have never been sufficiently fortunate to meet them within.
>
> There exists a spirit of monopoly, and sycophancy in the Medical School of this place that's unrivalled any where. And I have no doubt that they will try to have somebody from here; though I believe Dr. Smith stands a fair chance. I shall cite the Finis of Dr. Caldwell's Eulogy on Dr. Wistar delivered a few days ago, by which you will be enabled to perceive what wretched flattery exists here.
>
> Though the Dr's appearance and eloquence would have been better at the field of Bunker's Hill, having more the oratorical powers and appearance of a soldier than a physician or orator, yet these were his words. "We have lost a Rush, a Barton, and a Wistar, yet by the judicious selections of the Trustees" (not one physician amongst them and therefore unable to judge) "those chairs have been so well filled that they equal if not surpass their predecessors. But a Wistar. He that will fill a Wistar's Chair, must be a great man. And such we have amongst us. We need not seek for them abroad."
>
> My humble advice therefore, would be this. As the election will not take place until some time the next Spring or Summer (though I shall try my best to see 5 or 6 of the Trustees and exert my little influence so far as it goes) for you to come here, for nobody can do one's business as well as one's self. But in order to make your journey effectual, if you would procure letters to some of the most influential Trustees, particularly to Mr. Meredith, it would be well for you. He has great influence in the Board and being a Yankee swims always on top, and does with the others whatever he pleases.
>
> That you may succeed according to your merits and your virtues are the ardent wishes of, Dear Sir, your friend, J. Horwitz.
>
> P.S. In going to the Post Office I luckily met with Bishop White (a Trustee) in Market St. who informed me that there will be a meeting tomorrow evening of the Board, and that the whole Faculty has drawn up a petition in favor of Dr. Smith, that Dr. Warren of Boston and Dr. Hewson from here are candidates. Dr. Warren is also strongly recommended, but this ought not to discourage your exertions.

Reference to Caldwell's published speech reveals no statement relative to Wistar's successor in their midst, but a communication from John Collins Warren of Boston to Spalding further beclouds the issue:

> As you may have heard something about my being a candidate for the Anatomical Chair at Philadelphia, and as these things are often strangely misrepresented, I beg leave to trouble you with the Statement; That I am not and never have wished to become a competitor for that affair. Gentlemen of Philadelphia strongly urged it, and Dr. Dorsey and Dr. Caldwell were favorably inclined: in fact as they say, originally proposed it, but I never for a moment could seriously think of leaving Boston and a multitude of friends. Dr. Dorsey will be the successful candidate for Anatomy. Coxe will take Materia Medica, and Hare Chemistry. There is, however, so much *Intrigue*, that neither is sure but the first.

In any event the eventual appointment of Dorsey to fill Wistar's chair was a most popular one in Philadelphia. His personal charm and admitted brillance bade fair to weld together all opposing forces for the advancement of the Medical School. Thoroughly alive to his opportunity, on November 2, Dorsey delivered an introductory lecture to the medical class which was to mark the dramatic climax of his life. Of his feeling of inadequacy he said,

> The present incumbent is well aware that much strength must be necessary to flex the bow of Ulysses; yet he ventures without affectation or diffidence to attempt it and not without a hope that at a future day he shall have achieved by diligence some better claims to his present distinction. All he can even promise is his honest, zealous, and unremitting effort to discharge those duties heretofore performed by men whose memories are embalmed in the heart of every votary to medical science and whose glory no longer in its zenith still casts some lingering beams around the horizon, once illuminated by their noon-tide splendor.

With powers of speech which he denied, Dorsey outlined the functions of a teacher of anatomy:

> The anatomist has no field for the display of fancy; with him every subject is detailed as plain matter of fact. No oratorical displays of rhetoric or eloquence can aid him to enliven your attention; his eloquence is of the hand; his rhetoric of the scalpel: But when years shall have rolled away, and when your memory shall be tasked to recall the vestiges of scholastic learning, when your teacher's tongue shall be silent, and his hand motionless then the impressions derived through the medium of your senses will be found fresh and vivid, long after the collections of impassioned oratory shall have faded from your minds.

The brilliancy of Dorsey's introductory speech was widely acclaimed and a future comparable to or even exceeding that of his predecessors in anatomy at Pennsylvania, predicted for him.

In the preparation of this speech Dorsey had neglected the fire and expressed the belief that he had become chilled. Chapman in his eulogy said, "On the evening of the same day he pronounced his Introductory Lecture, and while the praise of it still resounded, he was attacked with a fever of such vehemence that in one short week it closed his existence, leaving us only his enviable name and his inestimable example." Afflicted with a fulminating illness, diagnosed as typhus fever, and from every indication judged fatally stricken from the .outset, Dorsey sought religious solace from his friend Dr. Janeway, to whom he said, "Doctor, is it not remarkable, after having delivered my introductory lecture, I was praying to my God, that He might not postpone my repentance to a dying bed; and in one hour after that prayer, I was smitten with my disease." In the presence of Physick, Chapman and several medical students, Dorsey requested baptism and on the completion of this ritual declared, "I have a desire to live and remain with my family; but my desire to be with Christ is far greater." He died November 10, 1818. Thus passed the most brilliant and best beloved of the new Pennsylvania Faculty to join his teachers Shippen, Woodhouse, Rush, Barton, Kuhn and Wistar, all lost to the University in one short decade.

Grateful acknowledgment is made to Dr. William Snow Miller for the reproduction of the engraving of the John Syng Dorsey portrait, and to Mr. Charles Perry Fisher, librarian of the College of Physicians, Philadelphia, for the photostatic impressions herein reproduced.

LEWIS MORGAN

THE NOTEBOOKS OF A TORY MEDICAL STUDENT

By WALTER FREEMAN, M.D.

WASHINGTON, D. C.

A BEARDLESS boy, three thousand miles from home, establishing himself amid new surroundings, making new friends, taking up new studies under gray Scottish skies: such is our first glimpse of Lewis Morgan in the fall of 1771. Not yet fifteen years old, he had come from Bridge Water, New Jersey, to take up his medical studies at the University of Edinburgh. The ancient city, so different from the primitive towns he knew in America, the University itself, the coming and going to classes and hospitals, the dignified professors, all these must have interested him deeply. One of his most vivid impressions must have been that of seeing Benjamin Franklin upon the occasion of Commencement. He has left us no record of such impressions, but Franklin has done so through an exchange of letters with Dr. Thomas Bond of Philadelphia.[1] Bond was puzzled, did not know where to send his son to study medicine. "Most of our young men," he writes, "have depended on Edenbourgh [sic] and London for their Education. The school of Edinburgh seems at this time better calculated to please the fancy than to form the Judgement, and, indeed, the many extraordinary Novelties incullcated there would be a Barr to public Confidence in this Part of the World." In reply, Franklin reassures him, supposes that "your son Richard will spend some time in London . . . and yet the general run is at present to Edinburgh: there being, at the opening of the Schools when I was there November last, a much greater Number of medical Students than have ever been known before. They have indeed a Set of Able Professors in the several branches, if common Opinion may be rely'd upon." Lewis Morgan was one of these students. What he learned there is in part preserved in two volumes of manuscript notes that have been handed down as precious heirlooms.[*]

That Morgan enjoyed certain rights and privileges is indicated by Johnson in: "A Guide for Gentlemen Studying Medicine at the University of Edinburgh," published in 1792.

> Gentlemen who attend the college of Edinburgh enjoy advantages which are denied them in other Universities; they are allowed to reside where they please, are not distinguished from the other inhabitants by any peculiarity of dress, and are confined to no particular routine

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[*] The notes are written on ordinary note paper, bound in boards with leather back and corners. The ink is very black and legible after nearly 160 years. The Monro notes have been cut down slightly. They consist of 174 pages with index, an introductory lecture on the history of anatomy beginning, and two lectures on venereal diseases concluding them. The Cullen notes of 131 lectures occupy 252 pages. In both cases the notes run through to the end of the book so that it seems likely that they were bound after being written. Lewis Morgan's signature appears on the fly-leaf of the Cullen notes. The Cullen notes were left to me by my father, Dr. Walter J. Freeman of Philadelphia whose paternal grandmother was Lewis Morgan's daughter. The Monro notes were given to me by Mrs. Francis La Bau of Tarrytown, New York, whose husband was another of his descendants.

of study. (Medical students must attend a certain number of classes.)

In this manner genius is not cramped, and gentlemen have not an opportunity of loitering away their time in licensed idleness, which often happens in universities where the former monastic regulations prevail.

In addition to his attendance at lectures Morgan was probably permitted to serve as clerk in the infirmary, although this privilege may have been reserved for more advanced students. From the character of the lectures, dealing with the causation and cure of various diseases, it may be assumed that the differential diagnosis and practical treatment were adequately handled either in the clinic or under the guidance of younger teachers. "Every student," says Johnson, "who attends the clinical lectures, should examine the state of the patients at hours different from those appointed for the professor's visits, such as morning and evening. If the disease is of such a nature that questions cannot be put to the patients themselves, the necessary information may be obtained from the nurse."

Medical societies flourished at the time Johnson wrote. They appear to have held rather formal gatherings for scientific discussion and case reporting. Indeed our own undergraduate medical societies of today would seem to be patterned directly upon them. That free rein was given to the intellectual ferment of the time may be inferred from the motto, *Nullius addictus jurare in verba magistri.* by which the students were led to discuss problems of mutual interest without restraint, and unhampered by the opinions of the professors. The principal function of these societies seems to have been the collection of medical libraries, and the loss of volumes was prevented by a semi-annual collection of all the books outstanding. The dues of these societies were rather high, but the privileges were commensurate. The first of these Societies was instituted in 1737, and even obtained a special hall in 1776. By 1792 there was an American Medical Society, but of the date of its founding I have no information.*

We do not know what previous education Lewis Morgan had received. Princeton, King's College and Rutgers have no record of his attendance, and he is not listed among the students or graduates of Edinburgh. He wrote well for a boy of fifteen, and showed some ability in the use of Latin and Greek. The flowing style of his notes indicates that they were written subsequent to the lectures, and their brevity that they were abstracts rather than verbatim transcripts. Indeed, when compared with similar notes taken by other students at about the same period (of which there are a number of copies in Philadelphia and Washington) they appear rather curt and condensed. Errors in pagination, and a notation "Lecture 100 lost" also indicate that they were written out, possibly from scribbled notes, after Morgan had left the lecture hall. Such a practice was favored at this time, according to Johnson, since it compelled the student to pay close attention during the lecture and to recall the substance of it later. Where lectures are few and important there is much to recommend this method. The usual lecture, however, has been described as a method for transferring statements of fact from the professor's notebook to that of the student without the necessity for cerebration by either.

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* In a personal communication Dr. J. Lorrain Smith, Dean of the Faculty of Medicine, Edinburgh, states upon the authority of Dr. J. D. Comrie that: "The American Medical Society was a small student's society which flourished about the middle of the eighteenth century and afterwards. It cannot have contained more than 20 to 30 members at the most. I am unable to say exactly when it began or when it ended (probably about 1775), nor do I know what became of the minutes, which were probably taken to America by the last Secretary."

At this period, just before the Revolution, The School of Edinburgh was at the beginning of its glory, drawing students not only from all over the British Isles, but also from the Colonies: and the tradition of medical education in this country has rightly been considered to be based upon that of Edinburgh. Rush, Shippen, John Morgan, Physick and others whose names are connected with the earliest medical teaching in this country derived their original instruction and inspiration from this school and its great masters. By 1771 the school of medicine in Philadelphia had been in operation for six years, but its reputation was not established, and then, and even to a much later period it was the custom for young men to obtain at least part of their medical education in Europe. Not only was the instruction better systematized, but as Toner[2] explains, the means of communication between places in different colonies were so difficult and irregular that it was often easier to go abroad. The Colonies had yet to be welded into a new solidarity by opposition to a mutual foe, and each felt more closly bound to the mother country than it did even to its nearest neighbor. Edinburgh drew the greatest number of students in medicine, under the egis of the superb Cullen, with Monro secundus as an equally shining light.

Monro had inherited the chair of surgery from his father and was to pass it on to his son in that remarkable dynasty. Cullen, however, flamed as a meteor across the firmament of the medical student, became professor of chemistry in 1761, and in 1766, upon the urgent demand of the students, was appointed Professor of the Practice of Physick. His original contributions may not have been many, but his eminence as a teacher cannot be adequately stressed. He broke with the tradition of the past, gave his lectures in English, accompanied them with demonstrations in the hospitals, provided a synopsis of medicine to guide his students, and introduced them not only to the ancients in medicine, but also to the advances that were being made by his contemporaries. As Thomson[3] says: "Intimately acquainted with the views of his predecessors and contemporaries, he united a vigorous and discriminating understanding, matured by observation and experience, with the most felicitous powers of exciting the curiosity and directing the pursuits and studies of his pupils." He lectured brilliantly, with few notes, modifying the lectures from year to year, and the students were never impatient.

Cullen's systematization is tedious and his theory often fallacious when judged by present-day standards, but they merely reflected the period in the late 1700's, when, intoxicated by the new knowledge that resulted from the assembling and classification of data, and urged forward by the presiding genius of Linné, Haller, Sydenham and Boerhaave, every teacher fell to classification in his field. This is especially reflected in the volume published by Cullen at this time, the "Synopsis Nosologiae Methodicae," which later went through many editions, and to which he referred frequently in his lectures. Outlined in 1769, it was published in 1772 during the period of Morgan's studentship. The book is written in Latin and is divided into four parts, each devoted to a classification of diseases by different authors, Linné, 1763: Vogel, 1764: de Sauvages, 1768: and Cullen, 1771. Although Cullen's classification may to us seem primitive and cumbersome, it is far superior to those offered by his predecessors, and the wide reading and correspondence of the man are shown in his references to contemporaneous and earlier authors. The subdivisions of nosological conditions are, of course, extreme. Not only are all sorts of symptoms erected into morbid entities, but even the geographical distribution given preponderance. Thus among the varieties of subtertian, fever we find: Amphimerina Hungarica, Languor Pannonicus, Febres pestilentes Aegyptiorum, Morbus epidemicus Leidensis, Febris biliosa Lausannensis, Tritaeophya Wratiflaviensis, Tritaeophya Americana, Febris anomala Batava, Morbus Naronianus, Febris remmittens Indiae Orientalis. Even the epidemic diseases of different years are given as sub-species and variants.

The Synopsis, however, was a mere outline upon which his lectures were based, and consequently makes dry, dull reading. His lectures, to judge from the notes, were brilliant, philosophical, with a bit of dogmatism, and in their crispness and lucidity they more than made up for what they lacked in accuracy and practicability. Cullen stressed the importance of the nervous system in disease, indicating (after Hoffmann) that the relaxing effect of contagion upon the nervous system was such as to cause a spasm of the "extreme arteries" producing now a chill and then a fever. "The weakness and paleness and other phenomena that appear in the cold fit of the fevers plainly show the collapse of the extreme vessels . . . The heart and arteries in consequence of the vis medicatrix established in the body endeavor by redoubled action to get the better of the resistance in consequence of which the hot fit is produced." Although he recognized subtle poisons, miasma, and the contagium animatum, Cullen was much aroused to the constitutional predisposition of the individual, to the state of spasm or debility, and to the occasional or proximate causes of disease in gluttony, drinking, venery, and "passions of the mind, such as fear, etc."

Cullen rejected the theory of cure through the expulsion of morbific matter in the eruption of pustules and buboes, in epistaxis, salivation, etc., claiming that such events were symptomatic and not critical. Next to the pyrexiae, general and local (phlegmasiae), Cullen considered the neuroses of the utmost importance, giving due weight to the nervous system in coma (due to pressure on the brain), epilepsy, asthma and the iliac passion, as well as recognizing the dominant rôle of the nervous system in dyspepsia, hypochondriasis, chorea, tetanus, hysteria and insanity. But he also

TABLE I

Causes of Dropsy. According to Lecture Notes.
Dropsy is occasioned by,
I. Effusion from,
  1. Increased exhalation, occasioned by,
    A. Resistance to the return of venous blood by,
      a. Obstructions of the lungs.
      b. Obstructions of the heart.
      c. Obstructions of the liver.
      d. Posture of the body.
      e. Venous plethora from,
        (a) Obstructed menses.
        (b) Obstructed hemorrhoids.
        (c) Obstructed serous evacuations.
      f. Obstructed veins by,
        (a) Polypus.
        (b) Compression from,
          aa. Tumors in the coats of the veins.
          bb. Tumors external to the veins.
            aaa. Schirrus.
            bbb. Steatom.
            ccc. Pregnancy.
          cc. Fluids accumulated, as in ascites.
    B. Resistance in the excretories.
    C. Increased impetus in the arteries.
      a. By external violence in strains and bruises.
      b. By internal violence in the fits of a fever.
    D. Relaxation of the exhalants,
      a. In paralytic affections.
      b. In general relaxation, as in chlorosis and cachexy.
    E. Increased proportion of watery fluids,
      a. By the quantity taken in.
      b. By the grosser parts drawn off, as
        (a) The red globules.
        (b) The lymph in serous and purulent evacuations.
      c. The watery portion unduly retained, as in obstructed perspiration and urine.
  2. The rupture of lymphatics.
  3. The rupture of vesicles and sacs.
II. Diminished absorption.
  1. Venous obstruction in parts not provided with lymphatic absorbents.
  2. Lymphatic obstruction.
    a. In the general passages.
    b. In particular absorbents.
  3. Palsy of the absorbents.

included among the neuroses dropsy, pyrosis, cholera, diabetes and pertussis. Gout seems to have been a later addition. His passion for classification is indicated in Tables I and II.

Therapeutics occupied an even greater place in Cullen's lectures than did etiology and pathogenesis. The same remedies occur again and again in the notes. Bleeding, purging, blistering, vomiting, sweating, the actual cautery: two or more of them were recommended for almost every affection mentioned: and their application was vigorous, sweating for twelve hours, for instance. Medication was emphasized, although no prescriptions were given, and the drugs were administered one or two at a time. Peruvian bark held first place in Cullen's pharmacy, with opium, wine, mercury and herbals widely used, but exercise, cold bathing, draughts of water, and a sparing diet were also largely recommended. In regard to scrofula, for instance, he recommends the drinking of sea water, and cold bathing, as specific. Probably the sunlight that the patient absorbed while undergoing such a cure was the real specific, but this remained for a later generation to discover. Cullen was closer to fact when he recommended green vegetables for scurvy, but he probably erred in ascribing the disease to salted or decayed meats.

Cullen did not pretend to know everything. Many conditions he skipped over. Of other conditions he remarks that the "theory is very difficult and not yet fully established." It was in classification of morbid states and the rationale of treatment directed against them that Cullen scaled the heights. Occasionally one encounters lighter touches in the notes as taken by Lewis Morgan. In speaking of gout, for instance, Cullen is

TABLE II
Treatment of the Pyrexiae

The general indications in the cure of fever are either:

- I. To take off the excess of stimulant power.
  - 1. By obviating its effects upon the increased action of the heart and arteries which may be done.
    - A. By avoiding the irritation,
      - a. Of impressions and their consequences in,
        - (a) Sensation.
        - (b) Thoughts.
        - (c) Passion.
        - (d) Cold and heat.
      - b. Of motion.
      - c. Of aliment.
      - d. Of internal stimuli,
        - (a) Thirst.
        - (b) Faeces retained.
    - B. By refrigerants,
      - a. Acids.
      - b. Neutrals.
      - c. Metallic salts.
    - C. By diminishing the tension of the arterial system which may be done by,
      - a. Blood letting.
      - b. Purging.
  - 2. By restoring the cause, chiefly the spasm of the extreme vessels, which is done by restoring the determination to the surface of the body,
    - A. By internal remedies,
      - a. Diluents.
      - b. Neutral salts.
      - c. Sudorifics.
      - d. Emetics.
    - B. External remedies,
      - a. Blistering.
      - b. Warm bathing.
- II. To obviate the effects of sedative power by supporting or restoring the tone of the arterial system by,
  - 1. Cold,
    - A. Applied internally by cold drink.
    - B. Applied externally as cold air or water.
  - 2. Tonics.
    - A. Astringents, fossile or vegetable.
    - B. Peruvian bark.
  - 3. Stimulants.
    - A. Vegetable substances.
    - B. Wine.
  - 4. Antispasmodics.
    - A. Opium.
    - B. Camphire.
    - C. Musk.
    - D. Oleum animale.
    - E. Volatile alkali.
- III. To obviate the effects of septic power,
  - 1. By avoiding the remote cause or other means of increasing putrefaction,
    - A. By taking off the excess of stimulants.
    - B. By avoiding places filled with noxious effluvia.
    - C. By avoiding the accumulation or retention of the patients own effluvia, whether those of his perspiration or other excretions.
    - D. By the evacuation of bile or other putrescent contents of the alimentary canal.
  - 2. By evacuating the putrescent or putrid matter of the blood by promoting sweat.
  - 3. By the use of antiseptics,
    - A. Cold.
    - B. Plentiful dilution, favoring III, 2.
    - C. Vegetable aliments.
    - D. Acescents and acids.
    - E. Neutral salts.
  - 4. By tonics,
    - A. Cold.
    - B. Peruvian bark.

reported as saying: "Dr. Musgrave gives us an account of a great variety of cases, more than he could have had experience of." And in another place is, perhaps, an unconscious slap at Sydenham, to whose memory Cullen frequently paid tribute. As interpreted by the callow medical student, Cullen said: "Gout . . . seldom attacks the poor but always the rich and those that live in ease and indolence. The cure of the disease is as well delivered by Dr. Sydenham as it can be: as he was subject to it himself for thirty years." Not often does Cullen moralize, but again, in speaking of gout, he refers to excessive study as a possible cause, although he applied this not so much to medical students as to those engaged in business or literature. "But there is one kind of study for which there can be no excuse, viz., gaming."

Monro seems to have been of an entirely different type, the practical surgeon who told his students what to do for their patients. The notes give detailed directions for suturing, venesection and other simple operative procedures, indicating that the lectures were not accompanied by practical demonstrations. Indeed, experience was probably quite limited. Cadavers were obtainable only in small numbers and at prohibitive cost or considerable personal danger, so that private dissections were nearly impossible.

It is remarkable to note the space devoted to operations below the belt. Herniotomy, urethrotomy, cutting for stone, cesarian section, circumcision, castration, operations for fistula, prolapse, hydrocele, imperforate hymen and anus: these operations and a treatise upon venereal diseases make up nearly one-half of the Monro lecture notes. Directions for tying patients on the operating tale are given in considerable detail. "Such security is absolutely necessary, even in the most resolute person," he says in speaking of the various tapes used in lithotomy. Unlike Cullen, whose treatment was unitarian, Monro gave various operative procedures, often with a little historical sketch, and then discussed his own preference. In addition to his urological interests, however, Monro taught his students how to operate for cataract, impacted cerumen, painful teeth, cleft palate, and of course the major surgery of warfare. His directions for intestinal anastomosis in cases of injury and gangrene were sensible, although he admitted that such conditions were accompanied by a very grave outlook. Minor surgery, including the seton and the pea-issue, and the suturing of wounds, was well handled. Coming from Monro's course in surgery, the young doctor was technically qualified to carry out the most painful and disagreeable procedures that the clinician could devise. One sometimes wonders, however, whether a return to some of these procedures would not do away with some of the vague aches and pains that encourage the prescribing of proprietary analgesics in the present day. Empirical these remedies may have been, but in many instances modern physiology is demonstrating the basis for them. The fixation abscess is not a myth, dehydration is proving important in a number of conditions and is most rapidly and effectually accomplished by the removal of blood, local axon reflexes might very well underlie the fact of relief of pain through blistering, leeching, cauterizing. The remedies of those days deserve revaluation.

Lewis Morgan finished his medical courses in March, 1772, if the notebooks may be accepted as evidence, and probably returned to New Jersey immediately. It was the custom then and until long afterwards for the young man to study medicine with a preceptor, but we have no record of any such relationship in his case. His father was a justice of the peace in Somerset County.[4] At about this time another physician enters the picture only to leave again. Stephen Camp, a graduate of Princeton in the class of 1756, died in 1775, at the age of thirty-six. His widow married the father of Lewis Morgan the following year, and his daughter, at this time a girl of fifteen, was later married to Lewis Morgan. It seems improbable that Camp acted as preceptor for Morgan on account of Camp's own youth, but there were a number of other physicians in the same territory, to judge from the early transactions of the Medical Society of New Jersey,[5] and Lewis may have worked with one of these men. Although the regulations were promulgated only at a later date, the Society was, from the first, interested in elevating the standards of medical practice, and finally decided that: "The apprentice must be refused unless he has a competent knowledge of Latin and some acquaintance with the rudiments of Greek, and will serve not less than four years, one of which may be spent abroad, and pay one hundred pounds proclamation money, as apprentice fee."[6] The last years before the outbreak of the Revolution were therefore probably spent by Morgan in completing his education, and the fateful Summer of 1776 found him in his nineteenth year.

"Inter arma silent doctores." Lewis was of a Tory family. His father was imprisoned by special order of General Washington in the gaol at Morris Town.[7] We may infer, therefore, that the activities of the elder Morgan were obnoxious. Lewis enrolled as captain-lieutenant in the third New Jersey Volunteers, Skinner's Greens, on the day before Christmas.[8] The only major engagement recorded was the battle of Staten Island, August 22, 1777, when the troops, surprised, beat off an attack of the patriots. Lewis was promoted to Captain two months later, although there is no citation to indicate outstanding bravery. These battalions operated in a fashion more or less irregular, taking part in what was really a civil war in northern New Jersey. Much of the population was Loyalist, a "Tory Den" being mentioned in Holland Township, Hunterdon County.[9] Many major activities of the Revolutionists also took place in this rather restricted area between New York and Philadelphia. Just when Morgan was transferred from his company to a medical organization is uncertain. Skinner's Greens commenced to operate in the Carolinas and the companies were consolidated, indicating heavy losses, probably in resignations and expirations of enlistments. Lewis was married in 1780, and in 1784 his father paid to Isaac Decou £ 52/19/9 upon "Skinner's Order,"[10] which may have been back pay for his son's substitute. At any rate Lewis began exercising his medical talents in H. M. General Hospital at New York. He refers to himself as assistant surgeon, although he is carried on the rolls as supernumerary mate.[11] With the ending of the War he seems to have avoided returning home, many possible reasons for which could be adduced, but instead of emigrating to New Brunswick as did many of the Loyalists, he applied for permission to go to the Bahamas. In a letter to Gov. Carleton at New York dated July 17, 1783, he requested this, together with an introduction to the Governor, "and such advance pay as your Excellency may think proper." Upon one of his memorials to Gov. Carleton is written, probably by the latter's clerk: "Praying for a recommendation to the Gov'r of the Bahamas & for such benefit as others have rec'd going to the Northw'd," and again: "There is no Governor there but Mr. Morgan shall have the same advantages as others."

The Bahamas had been taken in

May, 1782, by the Spaniards, assisted by some American ships, and were retaken by the British in the last military operation of the war in April, 1783. It may have been, therefore, that conditions were too unsettled for Dr. Morgan to risk taking his wife and children to the Bahamas. The Colonial Secretary's Office at Nassau in a courteous reply to a recent inquiry reveals no record of his residence or ownership of land in the islands. The only other clue to his residence in the West Indies is a pencilled note in the family Bible indicating that one of his daughters was born in Barbadoes in 1786.[13] I have been unable to verify this.

Lewis Morgan evidently returned to New Jersey in 1787 and practiced medicine at Burlington. Presumably things did not go so well in spite of the fact that the young physician was equipped with "1 Rideing Chair" for which his father had advanced the sum of forty pounds.[10] It may be that Lewis had obtained some idea of the dignity of the profession and of cheap transportation from his experience in the West Indies. At any rate, nothing more is heard of this chair, and we may presume that his wife thought often and regretfully of it as the babies continued to come with clock-like regularity. In 1791 the elder Morgan paid a large bill for moving household effects from Burlington to Rahway. Lewis started again.[10]

The Medical Society of New Jersey held its semi-annual meeting in Burlington on November 6, 1787 at the house of Col. Oakey Hoagland.[5] Fifteen members were present, and six new ones were elected, including Dr. Lewis Morgan. He heard a resolution passed directing the president to write to the president of the Medical Society in the "State of Massachusetts Bay," and acquaint him with the rise, progress and present state of the New Jersey Medical Society, and to solicit a similar communication from him relative to that Society, and also to propose a correspondence between the Societies." The New Jersey Medical Society was at this time celebrating its majority, having been founded in 1766. The President, Dr. Burnet, closed the session by reading a dissertation "On the Nature and Importance of the Healing Art, The Necessity of our Indefatigable Researches after Medical Knowledge: together with a few Observations on the Effect of Opium in the Cure of Dysentery."

Whenever the Society met in Burlington, Morgan was present. Otherwise his name appears more frequently in the absentee list, but he probably presented excuses that were acceptable. He proposed for membership in the Society his distinguished fellow-Tory, Dr. De Normandie. He was present in 1790 when a petition was drawn up for the incorporation of the Society, with a membership of fifty. Each physician was to receive a certificate of membership and pay a fee of ten shillings. The Legislature approved the petition, and the by-laws were agreed upon in December, 1791. For some reason, however, the program was unsuccessful and meetings lapsed after 1795. Meeting again in New Brunswick in 1807 the nine old members elected nineteen new ones and the Society again came to life. Two years later, on June 13, 1809, twenty members being present, Lewis Morgan was elected president for the ensuing year. He was fifty-one years old at this time, had made his reputation, had inherited some money from his father, and owned one of the oldest and best houses in Rahway, (Fig. 1) a house that was still standing in 1912.

FIG. 1. LEWIS MORGAN'S HOME IN RAHWAY, NEW JERSEY. IN A CLIPPING FROM THE *Times and Register* OF FEBRUARY, 1863, DEALING WITH RAHWAY'S OLD TIME PHYSICIANS, THE HOUSE IS REFERRED TO AS BEING "AS OLD AS ANY IF NOT THE VERY OLDEST HOUSE IN THE CITY OF RAHWAY. IT IS ALSO MEMORABLE AS THE HOUSE FROM WHICH THE REV. MR. HUBBLE AND HIS WIFE SUDDENLY RUSHED INTO THE STREET AND PERFORMED AN ACT BY WHICH THE PLACE DERIVED THE NAME OF SPANKTOWN, WHICH NAME IT RETAINED, AND WAS KNOWN BY, FOR MANY YEARS THEREAFTER."

His family was growing up, seven out of twelve children being alive at this time, one of them married. Three months after his election his wife died.[13]

We know little about the man himself. He is described in some reminiscences and traditions as being hot-tempered and witty. His portrait (Fig. 2) indicates an observing eye and a haughty mouth, with an aristocratic arch to the eyebrows. One can readily believe that the vicissitudes of fighting on the losing side and then running away may have left him with a sense of frustration that made him not altogether easy to live with. His impulsiveness and hauteur are suggested in the purchase of the riding chair very soon after his return from the West Indies. It very likely made him the laughing-stock of the little town of Burlington. At any rate, it seems certain that he discarded this means of transportation in favor of a black horse which he rode at breakneck speed through the streets of Rahway as if called on an urgent case, and which he jumped over the fence of his home instead of riding it around by the road.[14] It is said that when entertaining he used to light the way to his home by Japanese lanterns so that his guests might find their way in both directions with a minimum of inconvenience.

Of one incident we have two or three versions, but I prefer the account given by his granddaughter-in-law to that of Wickes. "During a freshet one spring Dr. Morgan was crossing the bridge at Rahway when the central span gave way and precipitated the doctor, his horse and carriage into the river. It was a serious predicament, but Dr. Morgan kept his head, faced the horse downstream and held his seat in the carriage. The populace gathered on the bank to watch the outcome. About a mile downstream he brought his equipage to shore, his horse exhausted, and himself wet through and very cold. Upon the bank, waiting for him, was his bitterest rival, Dr. Morris De Camp. Dr. De Camp took pity upon him and offered him a seat on the floor of his buggy to take him home the more quickly. "No, Sir," Dr. Morgan replied, "I had a damned hard ride, but I'll drown before I'll sit at your feet."

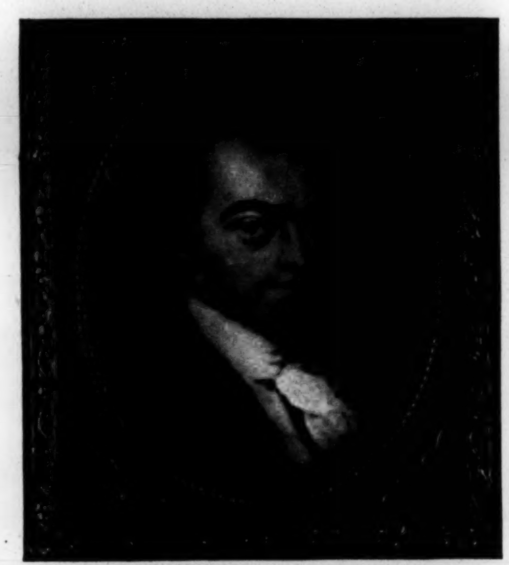


FIG. 2. DR. LEWIS MORGAN. AFTER A MINIATURE IN THE POSSESSION OF MISS ALICE M. FREEMAN, WASHINGTON, D. C.

On another occasion, according to tradition, he was summoned from his dinner to see a woman whose jaw was dislocated. Entering the room, he found the lady quite disturbed over her embarrassing deformity. "Madam," he demanded sternly, "what are you gaping at me like that for?" So saying he struck her on the jaw, turned abruptly and walked out. The lady was too astonished to express her gratitude at the immediately successful result.

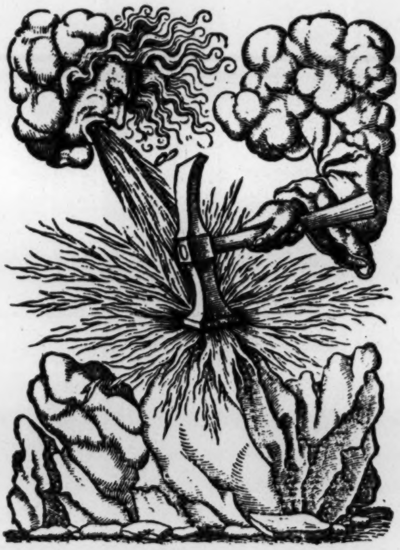
Of Lewis Morgan's professional accomplishments we know nothing. He has left no papers, even his presidential address before the Medical Society being mentioned merely by title. The passage reads: "The roll was then called over and the minutes of the last meeting read by the Secretary, after which an extraordinary case of bilious endemic, which took place in 1802, and the method of treatment, was stated by the President."[5] Morgan's name appears on committees appointed the following years to draw up rules for the examination of candidates and to draft a memorial to the Legislature regulating the practice of physic and surgery, so that his judgment and standing must have been well thought of, but after 1812 I find no further mention of his name in the transactions of the Society.

His declining years were probably busy ones and not altogether happy. His elder son turned to riotous living and was disinherited first by his grandmother and then by his father.[16] The other died at Aux Cayes, Haiti, in 1817, having gone there presumably upon a business venture. Yellow fever was very prevalent in the Caribbean in those days. Five daughters outlived him. He lies buried in Rahway, the inscription reading:[15]

Dr. Lewis Morgan
who died Jan. 12th, 1821.
in the 64th year of his age.

REFERENCES

1. PEPPER, W. The Medical Side of Benjamin Franklin. Phila., 1911, p. 53 et seq.
2. TONER. Contributions to the Annals of Medical Progress and Medical Education in the United States before and during the War of Independence. Wash., 1874, p. 95.
3. THOMSON, J. An Account of the Life, Lectures and Writings of William Cullen, M. D. Ed. 2, London, 1859.
4. History of Somerset County, New Jersey. Pp. 566, 644.
5. *Tr. M. Soc. N. Jersey*, 1766–1859. Newark, 1875.
6. TONER. *Op. cit.*, p. 77.
7. *Proc. N. Jersey Hist. Soc.*, s. 2, 13: 86.
8. RAYMOND, W. O. Roll of Officers of the British American or Loyalist Corps. *Coll. New Brunswick (Canada) Histor. Soc.*, No. 5, 224–280, 1904.
9. History of Hunterdon County, New Jersey. P. 429.
10. Accounts kept by Benjamin Morgan for his son Lewis. Photostat copy No. 3 in possession of Mrs. Walter J. Freeman Phila.
11. Report on the American Mss. in the Royal Institution of Great Britain. 1909, 4: 204.
12. American Mss., 50: No. 35; 38: No. 108. I was privileged to consult the original papers through the courtesy of Dr. A. W. Rosenbach, New York City.
13. Morgan Bible, in possession of Mr. Wm. S. Freeman, Phila.
14. Recollections of V. M. Freeman (Lewis Morgan's granddaughter-in-law) taken by Miss A. M. Freeman. Copy in possession of Mrs. Walter J. Freeman.
15. WICKES, S. History of Medicine in New Jersey and of its Medical Men. Newark, 1879, p. 336.
16. Will of Lewis Morgan. Photostat copy in possession of Mrs. Walter J. Freeman. Phila.



AN ESSAY ON THE HISTORY OF EPILEPSY*

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> If I wished to show a student the difficulties of getting at truth from medical experience, I would give him the history of epilepsy to read.
>
> —Oliver Wendell Holmes

EPILEPSY, from επι-λαμβάνω, was known in Greece as the disease of Hercules, the disease δαιμόνια, the sacred disease. Whether, as Boerhaave suggests, it was called epilepsy from the action of constables in seizing refractory ones, or whether it was so called from its appearance of taking possession of its victim as though animated with superhuman malignity, is debatable. So also with the designation, disease of Hercules: this is of course possible because some epileptics were known to have superhuman strength at the time of seizure. Josat would have it that Hercules himself had the disease, and he relates a legend of Hercules in which he was supposed to have suddenly had an epileptic seizure while in the very act of conciliating the gods with a votive offering. The implications in the Greek derivation are many and profound; interpretation shows that epileptics were considered to be possessed by something greater than man; that demons were very real powers for good or bad, and if they chose to deal out disease to mortals their acts were regarded as deplorable and probably irrevocable.

Latin synonyms for επι-λαμβάνειν multiplied rapidly. *Morbus sacer, M. divus, M. divinus, M. deificus, M. scelestus, M. Herculeus,* indicated the part the gods were suspected of taking in the distribution of epilepsy, while the latinized επι-λαμβάνειν became *epilepsis, epilepsia, epilempsis, syspana epilepsia. Morbus demoniacus, M. daemonius,* showed that evil spirits were still accredited agents of the disease, while *morbus lunaticus, M. lunaticus astralis, M. interlunius,* showed how vital was the superstition that the moon caused distempers of the brain, a superstition which may have been either result or cause of the belief, among the medically-minded, that excess of phlegm came about with lunar cycles, being noticeable at full and new moon. Long after this naive age lunar caustic ($AgNO_3$) was used against epilepsy because silver is the color of the moon which caused madness. In 1861, Holmes[134] remarked, " . . . we all occasionally meet persons stained with nitrate of silver, given for epilepsy . . . a white man as blue as the double-tattooed King of the Cannibal Islands." *Morbus puerilis* points to epilepsy as a disease of youth; *morbus major, m. minor,* show that epilepsy had been somewhat differentiated. Further versions of the term were: *deprehensio, clonus epilepsia, hieranosos, prehensio, morbus mensalis, catalentia, analepsia, cataptosis, morbus viradellus, m. sonticus, m. seleniacus, m. vitriolatus,* all partially descriptive. *Morbus caducus* referred to the usual fall of the epileptic; *morbus mensalis* probably to the periodic recurrence of epilepsy. *Morbus comitialis* was so called because the *comitia,* or meetings of the Senate in Rome, were dismissed whenever anyone present had an epileptic fit.

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Such a fit was believed to be sent from the gods, and was an omen of evil portent. The terms *morbus Sancti Valentini*, and *morbus Sancti Ionni* show that in later days saints were supposed to have taken an interest in the handiwork of lingering pagan spirits. Some say St. Vitus extended his help to epileptics, and there could be added the names of numerous saints such as St. Eunemond of Lyons, St. Nymphase of Cahors, St. Mathieu of Sens who were seemingly selected by separate communities as suitable patrons. St. John was particularly active in England, where superstitions concerning epilepsy were rife. A legend connected with St. John is supposed to relate to a Berkshire custom of making a ring from silver collected at communion service, and the Devon custom of making a ring from three coffin-nails. These hint at a belief that epilepsy was an entity which might be driven or kept away from men. To digress further, a similar mode of thought leads negroes in the southern United States to apply putrid possum fat to epileptics, while in the far reaches of the Adirondacks skunk fat is relied upon as a method of defense.

Returning to synonyms for epilepsy: in France there was a natural transition to *mal caduc, mal divin, mal St. Jean, mal de terre;* then *haut mal,* (*le grand mal*), *petit mal.* Sudhoff states that *pedicon* was a term meaning epilepsy.

An impression which tends to deepen with reading about this always mysterious disease is that throughout the ages it has set its victims apart from their fellows. In a way, great misfortune has been compensated in some degree by social distinction. Whether the victim was feared, as one possessed by evil spirits, or respected as one singled out by the gods, or angels, he had at least a melancholy dignity. Epilepsy and talent have been found together often enough, perhaps, so that by the *post hoc, ergo propter hoc,* type of thinking, epileptics have been often credited with gifts of sharp perception or sensitiveness amounting to something very like mystic inspiration. It is interesting to wonder how many of the clowns and fools who alone among the repressed common people had the privilege of free speech during long centuries, were epileptics, and so by common consent set apart and protected, and further how many witches and saints may have owed their "inspirations" to *le petit mal.* Many spiritual and intellectual leaders have rightly or wrongly been believed to have been epileptics: St. Paul, Mohamet,[150] Luther, Loyola,[132] Dante, Petrarch, Pascal, Schumann, Richelieu, Byron,[150] Paracelsus, Empedocles, Beethoven, Flaubert, Molière, Alexander, and many more such outstanding figures have been so classified. Pirkner[136] in a recent paper has given a fascinating and comprehensive study of the prevalence of epilepsy in historical and literary characters. Dostoievsky has written with the passionate conviction of experience of the effects of epilepsy in "The Idiot," "The Possessed," and "Brothers Karamazov." Plutarch[131] says of Caesar: "He was distempered in the head and subject to an epilepsy, which it is said, first seized him at Corduba."

The continued controversy over Napoleon typifies attempts of the over-zealous to read into eccentricities of genius the symptoms of epilepsy (though French medicine rallies to the defense of Napoleon). The more legendary character of Moses is still more vulnerable to suspicions of epilepsy. He has been considered epileptic because "he looked, and, behold, the bush burned with fire, and the bush was not consumed" (Exodus III, 2; Rosetti[130]). History and the sciences are sisters in that the less the information the more safely may dogmatic statements be made. It is interesting, however, to note the mental reversal so often met with in biographies and histories. This is that, not only are epileptics considered superhuman, but that the tendency has been to find an epileptic taint in genius.

From a purely human point of view, a curious twist to the whole story of epileptics seems to be this: as knowledge has grown, they have lost one great consolation which society in its ignorance and superstitious awe of the mysterious had given them; in our age of what we please to call rationality we are only piqued by the mysterious. We relegate epileptics to that great limbo of idiopathic diseases, where they are only a few among many unfortunates.

The complexity of opinions concerning epilepsy from ancient to modern times has widened to a vast panorama, including in its present scope almost the entire field of modern medicine. However, along with this increasing complexity there has gone an increasing knowledge of possible factors, based on rational rather than superstitious bases. The very earliest history of epilepsy is in all likelihood to be found in such obscure references as those dealing with demonology and man's relationship with the supernatural. However, an affliction exhibiting such a distinctive syndrome must have been frequently observed, and it seems remarkable that early writings contain so little appreciation of its entity.

The following, from William Heberden,[49] is as apt today as it was in 1782.

> The epilepsy may be called the reproach of physicians, as well as the gout. For it was well known before the writing of the most ancient medical books and as yet no certain method of cure has been discovered. The difficulty of curing this disease, either by the cautious practice of such who have a character to lose, or the more hazardous attempts of men who have a character to get, is sufficient evidence from its having remained uncured in some who were enabled by their wealth and power, and prompted by their credulity, impatience or despair to try all sorts of means for its removal.

As the object of this paper is the consideration of essential, or idiopathic epilepsy, it has been necessary to rule out (1) epileptiform, or atypical convulsions, those seizures whose picture greatly resembles that of genuine epilepsy, but which are secondary to such conditions as sudden anemia, tetanus, eclampsia, intestinal parasites in children, etc., (2) Jacksonian, or cortical epilepsy, being that epileptiform condition in which consciousness is retained or lost late in the process, marked by localized spasm, mainly of one side, and often of one group of muscles, which is always due to a mechanical factor intracranially.

Genuine, essential, true, or idiopathic epilepsy is in general characterized by a succession of events, ushered in by the epileptic aura which may be mental, sensorial, or motorial, the sensorial having been described as a "feeling of a breath of air on some part of the body passing upward toward the head." This period may be of various durations, generally short, but usually long enough for the patient to recline or take other precautions. Then follow a cry and unconsciousness. Immediately following this there is an onset of complete tonus. Intense cyanosis is an almost invariable accompaniment of the early stages. The patient falls rigidly to the ground, where the tonicity grades into clonus, followed by relaxation and later by a return to consciousness. It is usual for the exhausted patient to pass into a deep sleep for a variable period. A single seizure, however characteristic, never constitutes an epileptic condition.

The classical picture of a typical *grand mal* attack following the aura is given by Gowers,[54] 1881, as follows:

> At the onset of the severe fit the spasm is tonic in character, rigid violent muscular contraction follows, fixing the limbs in irregular positions. There is usually deviation of the eyes and rotation of the head toward one side, and this rotation may involve the whole body, and cause the patient to turn around, even two or three times. The tonic spasm involves the muscles of the chest and abdomen. The features are distorted. The face, usually at first pale, becomes suffused and then livid, as the chest is fixed and respiratory movements are arrested. The eyes are open or closed; conjunctiva is insensitive; pupils widely dilated as cyanosis comes on. As the spasm continues, it commonly changes in its relative intensity in different parts so that slight changes in the position of the strained limbs occur. Presently, when the cyanosis has become intense, the fixed tetanic contractions of the muscles can be felt to be vibratory, and the vibrations increase to slight visible remissions. As these remissions become deeper, the muscular contractions become more shock-like in character, and the stage of clonic spasm is reached, in which the limbs, head, face, jaw and trunk are jerked with violence. In the resulting movements of the chest, air is expelled from the thorax, and bloody saliva is frothed out between the lips. The air entering the lungs is at first insufficient to lessen the lividity, and the patient may seem to be at the point of death. But as the intervals between the shocks of spasm lengthen, and the remissions become greater, more breath enters the chest, and the lividity lessens. In becoming less frequent the muscular contractions do not become less strong, and the last jerk is often as violent as those which have preceded it. At last the spasm is at an end, and the patient lies senseless and prostrate, and usually sleeps heavily for a time, and then can be roused. Urine frequently and feces occasionally are passed during the fit.

That essential epilepsy is considered by many an idiopathic disease is probably due to the great divergence and inconsistency of findings. Many however consider it a symptom of a great number of nervous diseases.[59] "'Epilepsia sine materia' is a dead expression[60] . . . It would perhaps be better to drop the term 'epilepsy' and speak sharply of paroxysmal disorders or of the convulsive states."[60]

Briefly, epilepsy will be considered as (1) a disease entity, (2) a syndrome secondary to several pathological entities, (3) a symptom exhibited under numerous conditions, in all cases the epileptic picture being constant.

Throughout this study the clinical, pathological, etiological and therapeutic viewpoints have been necessarily observed, as they have been varyingly popular according to various schools of thought. The present trend toward specialization has brought the study of epilepsy to such a state of extreme complexity that it has been impossible to do more at the present writing than give résumés of a few of the more modern viewpoints. Those interested in following the trend of epilepsy to the present date will find that a reading of Gorn,[110] followed by Lennox and Cobb,[60] will give them a concise but remarkably comprehensive view of the subject's numerous phases from 1700 to 1928. An excellent bibliography is to be found in the paper by Lennox and Cobb.

> St. Valentine, besides, to such as does his power despise
> The falling sickness sends, and helps the man that to him cries.
> —Thomas Neogorgas, "The Popish Kingdom," 1570.

The study of the history of epilepsy leads us back to a dim world "whose margin fades forever and forever as we move," a world half-fact, half-myth, peopled with primitive men, and equally with creatures of their imagination. A great majority of writers on the history of epilepsy have begun with the comment that "the history of epilepsy is as old as man"; unfortunately they have not referred to facts on which to ground the statement. One can only conjecture as to epilepsy in prehistoric times. Such speculations as the following belong more properly in the field of romance. One such conjecture would be that *if* epilepsy were prevalent in neolithic times, and were considered to be due to an evil spirit in the head, (which from later observations would be more than probable) trephining as practiced by neolithic men was in all likelihood directed *partly* against epilepsy (Chipault[1]). The success of their surgical procedure may be judged, from skulls found, to have been fully as great as that of the Dutch trephiners as late as the 15th and 16th centuries (Muskens[2]). (It is remarkable that nine-tenths of the known neolithic trephines were over the superior or transverse sinuses.)

In a search for the earliest known records of epilepsy, one naturally turns to the Egyptian papyri. In the scanty material available the Ebers and London papyri (18th Dynasty) give no clues; the Hearst papyrus (also 18th dynasty) yields only vague fragments, for example, "To relax in any limb," and "A prescription for quieting twinges in any limb" (Hearst[4]). It seems probable that when these papyri were written epilepsy as well as all disease was believed to be of divine or demoniac origin, because in the papyri the magical formulae repeated were considered to be, if not cures in themselves, at least the more efficacious of the combined formulae and prescriptions. Illness at that period issued from suprabiologic sources.

I am indebted to Pirkner[136] for the following information from the Hebrew.

HEBREWS. Mishna is a collection of the scriptures of the Old Testament as well as oral traditions of antiquity, made by Rabbi Jehuda Ha-Nasi at the end of the second century after Christ. A similar collection is the Tosephtha. Scientific discussions during the first centuries of the Christian era grew around the more ancient writings, chiefly preserved as sanitary laws, and were assembled as the Palestine Gemara at the beginning of the third century, equally as the Babylonian Talmud (meaning the same as Gemara) in the fifth century. Mishna and the Babylonian Gemara together are universally referred to under the common name "Talmud." The Midrashim are collections chiefly of interpretations of the laws of the ancient Orientals.

The best known comparatively modern medical interpreter of Bible and Talmud is the Spanish scholar Moses Ben Maimon (usually referred to as Maimonides) 1131–1205.

The Greek translation of the Bible known as Septuaginta (LXX) is older than the Gemara. The later Latin translation is called the Vulgata.

BABYLONIANS. Medical jurisprudence had its inception in Babylon in 2080 B.C. with the Code of Hammurabi. That is also the period which the Babylonian Talmud records. Laws from that code in reference to the epileptic have been preserved and are observed almost literally today. Maimonides has rendered them in Arabic.

References to epilepsy in the ancient Hebrew writings appear only in the precepts of the sanitary law and reveal various interesting superstitions, but also some true facts which had been recognized at least 2000 years before Christ, when many Israelites still remained among the agricultural tribes of Asia Minor. The Jews then, in their language, referred to the epileptic as *nikpheh*, the bent one. The Old Testament, in relating the story of King Saul, uses the Hebrew word falling, *nophel*, the present participle of the verb naphal, to fall (also the Arabic word). For this information I am indebted to the Berlin scholar and physician Dr. Julius Preuss, from whose elaborate work[137] I have translated:

"The description of the seizure is distinct enough in the Gospels . . . When the spirit (*aura* in the Vulgata), *πνεῦμα*, corresponding to the Hebrew *ruach*, seizes him, the patient screams suddenly, falls down and rolls on the floor, foaming and gnashing his teeth, and frequently it has thrown him into the fire or water so that it may destroy him . . .

"As cause of the malady is mentioned improper behavior during cohabitation, but it remains equivocal, as so often in the Talmud, whether or not rather a warning *against* improper conduct was intended, and a threat of eventual serious illness of the progeny. There was, for instance, a teaching: Who stands naked in front of a burning light, will become epileptic, and who cohabits with a light lit, will beget epileptic children . . .

"When a child younger than one year, is lying at the feet of the couple during coition, it will become epileptic . . . Also when the parents cohabit in the chamber where the handmill is going, on which always a number of women are busy, the children become epileptic . . . Also coitus immediately after defecation . . . or after bloodletting had the same consequences for the children . . ."

The Midrashim contains one of the oldest collection of sanitary laws, older than the Talmud or the Old Testament. They report that the amulet (charm) in the form of a *bon mot*, or of some dried roots, was carried on a little chain or in a signet ring not only "by one who was epileptic, but also by one who intended to protect himself against the evil."

That there existed also some exact knowledge appears from the prohibition to marry a woman from an epileptic family, because epilepsy was considered hereditary.[137]

As long as attacks occur, an epileptic is not admissible as witness, whether the seizure happens only at certain definite periods, or perpetually without any fixed type. On the contrary, when the epileptic is healthy (gesund), he may testify, provided that his mind is truly and perfectly clear; because there are epileptics whose reasoning powers are disturbed even when they are healthy (free from seizures). It is therefore necessary to examine the testimony given by epileptic persons with particular care.[137]

According to Davies, disease in Chaldea and Babylon was in the control of a hierarchy of gods and demons; it is interesting to note that according to Sudhoff[6] the interpretation of the Chaldean concepts *bennu* and *sibtu* (epilepsy) would be epilepsy and contagion (seizure by demons) and in the Middle Ages, epileptic seizure came again to be regarded as a contagion.

At the time of the great Indian compendium, the "Charaka Samhita," 6th century B.C., there appeared to be a technical connection between the names of epilepsy and delusion.

> Lesson IXX, the lesson called *Ashtodariyam.* In this lesson shall occur the following: *Apasmara* or epilepsy (in which the patient believes that he is pursued by a black or a red-complexioned creature and becomes insensible as soon as the creature catches him), is of four varieties . . . *Apasmara*, or delusion, is of four varieties. They are (1) that borne of the wind, (2) that borne of the bile, (3) that borne of the phlegm, (4) that borne of all the faults together.

Although the compendium made by Charaka of the "Samhita" is of the 2nd century A.D., its material is the work of Agnivera based upon the lectures of his master Atreya, 6th century B.C.

Pirkner says:

> Sushruta has left to posterity the most ancient work on medicine of the Hindus. The Sushruta "Samhita" deals with the origin of the "Ayurveda," which means the science of life, and is one of the four "Vedas." The "Samhita," in the original Sanskrit written at least two centuries before the birth of Buddha (560), describes minutely in 120 chapters the entire field of medicine, obstetrics, and surgery.

From the translator[138] he quotes:

> *Apasmára.* A disease in which the individual loses the faculty of past cognitions.
>
> Causes: Excessive, inadequate, and improper attention to the objects of the sense as well as to their actions, partaking of filthy, impure, incompatible and uncongenial articles of food and regimen of conduct, repressing of any aggravation, natural urging of the body or aggravation of the *Rajas* (moral love, spiritual affinity in the psychic) and *Tamas* (nescience), or going in unto a woman in her menses, or indulgence in amorous fancies, fright, anxiety, anger, or grief leads to an aggravation of the bodily *Doshas* (humors) which in their turn affect the mind very greatly and give rise to *apasmára.*
>
> Description: The sense carrying *Srotas* (channels) of the body overwhelmed by the concerted action of the deranged *Doshas* bring in a predominance of *Rajas* and *Tamas* causing (in the meaning of: making) the patient *unconscious* and forgetful of all past memories. He writhes in agony and throws his hands and legs in convulsive jerks, with contracted eyes and eyebrows. He gnashes his teeth, with foam at the mouth, and falls to the ground with open eyes, the consciousness returning a short while after.
>
> The disease is called *apasmára* which is classified into four distinct types: viz. *Vátaja, Pittaja, Kaphaja,* and *Samipátaja.*
>
> Premonitory Symptoms: The throbbing of the heart, emptiness or lightness of the chest, i.e. a sense as if the external world is vanishing away fast, perspiration, pensiveness, fainting, stupid appearance, and sleeplessness are the symptoms which are usually found to usher in an attack.
>
> Symptoms: In the *Vátaja* type of *apasmára* the patient fancies that a dark supernatural being is coming after him to seize his person, and is frightened and faints in consequence, with shivering, grinding of the teeth, i.e., lockjaw, labored breathing and foaming at the mouth. Fainting is excited by a terror of being seized by a yellow and fierce-looking being in the *Pittaja* type which is further marked by thirst, increased heat of the body, perspiration, fainting, mild tremor of the limbs and restlessness.
>
> In the *Kaphaja* type is added exhibition of such symptoms as shivering, nausea, sleepiness, falling prostate on the ground and vomiting of mucus. Pain in the heart, thirst and nausea are the specific characteristics of the three types respec-

tively. But delirious talk and making of indistinct sounds are present in all the types.

The specific feature of all the three foregoing types manifest themselves in a concert in a case of *Samipátaja* type.

Discussion on Its Cause: The sudden appearance of the disease without any apparent cause and also its sudden spontaneous disappearance after a short while without any apparent treatment, have induced several medical authorities to hold that *apasmára* is not due to any aggravation of the *Dosha.*

These slight references comprise the history of epilepsy over a vast period in which superstition dominated all conceptions of disease. Hippocrates found that idea the *leitmotiv* of medical thought, and long after Hippocrates, when the church at Rome shed its light over Europe, the same theme recurred with appropriate variations. That we may more fully appreciate Hippocrates the following effort of 1926 is not out of order.

> In all ages, a certain group of persons have believed that the origin of seizures lay outside the realm of the physical. Hippocrates argued that this sacred disease was not, as was commonly believed, an evidence of *divine possession* on the part of various members of the god family, but like other diseases, was due to physical causes. In later centuries this idea was apparently lost and seizures became a matter of *demoniacal* possession. The rise of medical science again put them on a physical basis. At the present time (both gods and demons being dead) many psychoanalysts consider seizures an evidence of emotional possession.
>
> Clarke,[135] 1926, is the most prolific expounder of the psychogenic basis of seizures. He sees in convulsions a failure of adjustment to environment, an infantile unconscious striving after displeasure-pleasure pursuit ending in the final goal of a return to infancy, attended by the loss of consciousness and a convulsion. The essential epileptic, says Clarke, is a pattern of the oral and anal erotic; he is egocentric, emotionally inexpressive and excessively narcissistic. This produces a rigidity and inelasticity of the personality incompatible with flexible living, hence the explosive fit. The concepts of "anal-erotic" and "oral-erotic" are so general and so applicable to a large part of the human race that it seems unlikely that they play an important etiological rôle in seizures. Neither pin-worms embedded in the anal mucosa nor complexes buried in the personality are in themselves sufficient to produce a convulsion, though it is self-evident that such inciting causes when present should be removed (Lennox and Cobb).[60]

In "On The Sacred Disease,"[9] as in "On Airs, Waters, Places," Hippocrates decidedly maintains that there is no such thing as a sacred disease, in that all diseases come from natural causes and no one can be more consistently ascribed to the gods than any other. He states that it had only been called divine because of its incomprehensibility, but that on this basis many other diseases would be divine, a truth which time has not altered.

> Men regard its nature and cause as divine from ignorance and wonder . . . and this notion is kept up by their inability to comprehend it, and the simplicity of the mode by which it is cured, for men are freed from it by purifications and incantations. But if it is reckoned divine because it is wonderful, instead of one there would be many diseases which would be sacred . . .

(He here cites malaria, nightmare and somnambulism as mystical conditions.)

He does not hesitate to state that he thought epilepsy had been called divine by those who wished to cover their ignorance.

> . . . and they who first referred this disease to the gods, appear to me to have been just such persons as the conjurors, purificators, mountebanks, and charlatans now are, who give themselves out for being excessively religious, and as knowing more than other people. Such persons, then, using the divinity as a pretext and screen of their own inability to afford any assistance, have given out that the disease is sacred, adding suitable reasons for this opinion, they have instituted a mode of treatment which is safe for themselves, namely by applying purifications and incantations and enforcing abstinence from baths and many articles of food which are unwholesome to men in diseases.

He then describes their teachings, among which was one wherein the sufferer should not touch goats nor anything connected with goats (doubtless due to the similarity between epilepsy and the characteristic convulsions of goats). But he shows that under his observation the Libyans who lived in the interior, and, being goatherds, both touched, slept with, and ate their goats, were never afflicted with epilepsy.

> . . . all these they enjoin with reference to its divinity, as if possessed of more knowledge, and announcing beforehand other portents, so that if a person should recover, theirs would be the honor and credit; and if he should die, they would have a certain defense, as if the gods, and not they, were to blame.

Again, referring to the Libyans and their goats:

> . . . but when these things when administered in food aggravate the disease, and if it be cured by abstinence from them, then is god not the cause at all . . . but it is the food which is beneficial and prejudicial, and the influence of the divinity vanishes. Thus, then, they who attempt to cure these diseases in this way, appear to me neither to reckon them sacred nor divine. For when they are removed by such purification, and this method of cure, what is to prevent them being brought upon them and induced by other devices similar to these? So that the cause is no longer divine but human.

As he said here, if magic could cure epilepsy, man would be greater than the gods, and furthermore if epilepsy were due to a divine presence, man would be purified, not befouled.

> If they imitate a goat, or grind their teeth, or if their right side be convulsed, they say that the mother of the gods is the cause. But if they speak in a sharper and more intense tone, they resemble this state to the horse, and say that Poseidon is the cause. Or if any excrement be passed which is often the case, owing to the violence of the disease, the appellation of Enodius (Hecate?) is adhibited; or if it be passed in smaller and denser masses, like birds, it is said to be from Apollo Nanius. But if foam be emitted by the mouth, and the patient kick his feet, Ares (Mars) gets the blame. But terrors which happen during the night, and fevers, and delirium, and jumpings out of bed, and frightful apparitions, and fleeing away, all these they hold to be the plots of Hecate, and the invasions of the heroes, and use purifications and incantations, and, as appears to me, make the divinity to be most wicked and most impious.*

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* "Hippocrates (using δαιμόνιον which is of dubious meaning, but in the works of earlier Greeks it and δαίμων are generally put in a good sense), understands the popular belief to be good spirits, and therefore impossible in an impure disease. The earlier Christians, however, held that all the gods of the heathen were demons in a bad sense, that is to say, devils" (Francis Adams[9]).

Furthermore from one sentence it is clearly shown that Hippocrates considered epilepsy to be an hereditary affliction, a conception which has cropped out now and then throughout all its history and is only now being completely justified by adequate statistical methods (Davenport[11]).

> Its origin is hereditary like that of other diseases. For if a phlegmatic person be born of a phlegmatic and a bilious of a bilious and a pthisical of a pthisical and one having spleen disease of another having disease of the spleen what is to hinder it from happening that where the father and mother were subject to this disease, certain of their offspring should be affected also? As the semen comes from all parts of the body, healthy particles will come from healthy parts, and unhealthy from unhealthy parts.

Again, he states that it attacks a particular type, the pituitous, which would not be the case if it were supernatural. At this point he gives his conception of the anatomy of circulation and proceeds to state that the disease is connected with the brain; then he digresses to a description of the blood-vessels which connect it with the trunk; finally he more fully describes the brain and discusses epilepsy on the humoral basis.

> By these veins we draw in much spirit for they are the spiracles of our bodies inhaling air to themselves and distributing it to the rest of the body, and to the smaller veins, and they cool and afterwards exhale it.

Here it is interesting to note that he described ulcers and eruptions on the head in infancy as a tendency to ward off serious disease in after life. The phlegm began to be formed, he thought, while the fetus was yet in utero, by a softening presumably of the brain substance (and also by the pituitary) thus producing a secretion which, if excreted produced a healthy head but if accumulated produced a phlegmatic condition. Hence those who restored the balance with childhood ulcers were much less liable to epilepsy.

> The man becomes speechless when the phlegm, suddenly descending into the veins, shuts out the air and does not admit it to the brain or to the vena cava or to the ventricles but interrupts the inspiration.

The air entering the nose and mouth entered the brain and thence the veins and body where it became useful in producing all activities. Hence if blocked by the phlegm:

> . . . the veins do not receive it, the man loses his speech and intellect, and the hands become powerless, and are contracted, the blood stopping and not being diffused, as it was wont, and the eyes are distorted owing to the veins being excluded from the air; and they palpitate; and froth from the lungs issues by the mouth . . . and the bowels are evacuated in consequence of the violent suffocation . . . if the defluxion becomes copious and thick, it immediately proves fatal to him for by its cold it prevails over the blood and congeals it.

It is interesting to see that Hippocrates observed unilateral epilepsies. Epileptic convulsions are represented as being more fatal in children because their veins are small and cannot admit of the defluxion. He gives a curious account of a natural cure which the disease sometimes effects by fixing on some member of the body such as the mouth, eye, or head. This did not take place in adults, the veins being large enough to keep the blood from being choked by the influx of phlegm. When the disease attacked old people it was apt to produce death by apoplexy owing to the scantiness of blood in their veins, which was coagulated by the cold defluxion. Though Pelops, master of Galen, is usually credited with the first description of the aura, Hippocrates was well aware of its presence.

> But such persons as are habituated to the disease, know beforehand when they are about to be seized and flee from men either to their homes or to a deserted place and cover themselves up. This they do from shame of the affection and not from fear of the divinity as many suppose.

Hippocrates' theories of the causation of epilepsy and the natural effects of the disease were based on his humoral theory with several additions of the superstitions of the times. He attributes the disease in children to a melting down of the brain substance owing to an excessive exposure to heat and to the excretions thus produced. This phlegm, so-called, was in some cases occasioned by the south wind succeeding to cold north winds, (probably an observation of the mucous discharges due to colds resulting from sudden changes in temperature). He also stated that epilepsy is sometimes caused by sudden fear, a viewpoint held even to the present day, with as little foundation now as in Hippocrates' time. In old persons epilepsy was primarily engendered in the winter season, especially by fluctuations in temperature. In fact Hippocrates attributed a certain causative effect to all the seasonal changes, but especially to those more sudden ones of spring. After twenty years of age the disease was considered less apt to occur; the brain being more "consistent" did not "melt down" so readily while the blood in the veins was thought to be quite copious. In the case of habitual epilepsy from childhood he believed that attacks occured more often during changes of weather, especially in a south wind which rendered the brain more humid. That the disease was produced by a humid condition of the brain was shown by dissection of goats which had epilepsy. In these the brain was revealed as watery and of a foul smell. This he believed to be ocular proof of a material and not divine disease. Hippocrates then digressed to an interesting explanation of humoral pathology in relation to epilepsy and catarrhs. He repeats his former contention that the seat of epilepsy is in the brain, the organ of the senses and of intellect. He maintained, that the brain is that part by which we know, feel, think, and judge of right and wrong and foul and fair, that it is the seat of the passions, and that it is deranged by variations of phlegm and bile, the more violent by variations of bile. He argued against the heart as the seat of, or connected with thought and emotions, claiming that these are functions of the pneuma which passes directly to the brain and thence to all parts of the body. The then current concept of the pneuma was: an ethereal matter which performed the operations of mind, which in turn was the source of activity, intelligence and force. This pneuma, or "vehicle for the mind principle" in animals was homologous with the matter composing the stars, i.e., light or heat (Aristotle[13]). Hippocrates, however, did not clearly distinguish between the immaterial principle (soul) and its primary instrument (breath) which two (soul and breath) he held to be one and the same. This principle of a spirituous substance has continued down the ages under various guises. It was, according to Hippocrates, Galen, and Avicenna, an aerial or ethereal principle. Later, according to Van Helmont, Willis, and Steno, it was likened to light; even in the great mind of Newton this principle was considered a part of that elastic substance on which the reflexion and rarefaction of the sun's rays depended. Descartes held to an igneous principle while Boerhaave spoke of aqueous, and today we speak of electric (Dumas[15]). Soury[128] has written a delightful little article on the exact meaning of the term pneuma, and its philosophical significance which cannot be discussed here.

In summation, Hippocrates' views of the cause of epilepsy were briefly: that its seat was in the brain; the *materias morbis* was a cold phlegm or pituita secreted in that organ which, passing down to the blood vessels encountered the pneuma or principle of life, thus producing a convulsion by a coagulative obstruction. His opinion was adopted in full by Aristotle[13] ("De Partibus Animal."). As will be seen later a similar hypothesis was adopted by Lucretius,[17] and by the Arabians, while Galen based his fanciful opinions on the ideas of Hippocrates. Since it will appear later that one of the most promising modern theories is based on observations of the pituitary, Hippocrates' incrimination of pituita should be borne in mind (Harvey Cushing[16]). Furthermore, edema, the most constant operative finding in epilepsy, was well defined as early as 460 B.C.

In that arbitrary period from Hippocrates to Galen the historical field broadened to include Palestine, Alexandria, Rome, and a number of foreign conceptions were introduced. There were even at this early date signs of the impending revival of a demoniac causation. Aristotle,[13] 384–322 B.C., gave no sign of the transition, however, but held to Hippocratic views regarding immediate or material causation of epilepsy, derived no doubt directly from Hippocrates. But around 280 B.C. Serapion of Alexandria, pupil of Herophilus and Erasistratus, who took Aristotle as his intellectual leader, wrote with great vehemence against Hippocrates. His remedies for epilepsy savoured distinctly of superstition. A few of these may be significant, for example: castoreum, brain of the camel, heart of the hare, rennet from a seal and blood of the tortoise.[8] One wonders about the present day administration of liver of the cod, heart of the beef, pancreas of the pig, and fresh gall of the ox.

A little later Lucretius,[17] the Epicurean poet, 58 to 95 B.C., though in spirit differing from Hippocrates, espoused a similar hypothesis as explanatory of epilepsy. His case description, couched in the language of the muse, deserves complete quotation both for its lucidity and for the contrast it bears to the dry case reports of our mechanical age:

Oft too, some wretch before our startled sight
Struck as with lightning with some keen disease
Drops sudden; by the dread attack o'erpowered.
He foams, he groans, he trembles, and he faints;
Now rigid, now convulsed, his laboring lungs
Heave quick, and quivers each exhausted limb.

He raves, since soul and spirit are alike
Disturbed throughout and severed each from each

> As urged above, distracted by the bane;
> But when at length the morbid cause declines
> And the fermenting humors to the heart
> Flow back,—with staggering foot first treads
> Led gradually on to intellect and strength.
> —De Rerum Natura, III, lines 486–504.

Two points in particular should be emphasized; first, "since soul (animus) and spirit (anima-pneuma) are alike disturbed throughout," leading one to believe that he had in mind a much clearer distinction between the active principle and its vehicle than had Hippocrates; second, the conception of the heart in relation to the circulation: "and the fermenting humors to the heart flow back."

"Pliny (Caius Plinius Secundus, *c.* A.D. 23–79) assures us that crushed pig's testicles in milk are soverign against epilepsie. The testicles of old rams are similarly useful when mixed with ass's milk" (Josat).[143]

Celsus,[18] A.D. 26, adhered to humoral causation, speaking vaguely of "pernicious humor." He also made the observation that epilepsy more frequently attacks youth, an idea which has persisted for hundreds of years. In all likelihood there has been a long-standing confusion of the frequent secondary convulsions in childhood with the true state of idiopathic epilepsy. In like manner was conceived a connection between the sex organs and epilepsy which even in recent times has occasioned much comment. In "Psychic Epilepsy" Celsus says, "Comitial more frequently attacks men than women." (Modern statistics show no more than one-half of one per cent increase, and even this is probably due to the traditional errors inherent in statistics.) " . . . very often the first sexual intercourse of boys or the catamenia in girls removes the disease, *unless previously cured by medicine* . . . The patient must purge, must walk, and fast." The admonition to fast at first seems to bear a startling resemblance to the most modern therapeutic efforts against epilepsy in relation to acidosis and ketosis. If, however, cures were effected in this manner they were in all probability not directly connected with the fasting in the minds of practitioners. As Hippocrates had said, most healers advocated hygiene and hoped for luck. In the case of epilepsy the lucky element doubtless lay in the fasting portion of the hygienic panacea. "If these devices do not suffice, let his head be shaved then anointed with old oil, adding vinegar, and nitre, and salt water effused over it. Some have liberated themselves from such a disease by drinking the warm blood of a slain gladiator."

The last-named mode of therapy is a very interesting example of the part played by sympathetic magic in the treatment of epilepsy. All through history it is noticeable that this great erroneous principle governed the minds of men in efforts to cure disease. The association of specific deities with epilepsy will be remembered to have been based on this principle; for example, the horse-like antics of epileptics were attributed to Poseidon. All diseases, including epilepsy, have been treated on this basis; even in modern days, as witness Hahneman and homeopathy.

Celsus continues, "the last auxiliary is to take a little blood from the leg near the ankle; to make an incision in the occiput and apply the cupping instrument, also to burn in two places with a hot iron in the occiput and below it, where the first vertebra is connected with the head, that the pernicious humor may escape by them." This reference to cauterization may give a clue as to the prevalence of that practice in the Middle Ages as a cure for epilepsy. The implication as to its curative powers may be drawn from Hippocrates' views about the draining of phlegm from childhood ulcers, thus averting attacks later in life. (A most comprehensive study of epilepsy according to the contributions of Hippocrates, Celsus, and Galen, is to be found in the German, by F. Heller.[111])

The following references from the Bible, though dealing with the life of Christ, can be dated most nearly by the year of writing, 64 A.D. Mark IX, 17–29, is here quoted fully not only because it portrays an excellent epileptic convulsion, but because it suggests the elements of chance and nimble-mindedness which enter into successful faith healing.

> And one of the multitude answered and said, Master, I have brought unto thee my son, which hath a dumb spirit; And wheresoever he taketh him, he teareth him: and he foameth, and gnasheth with his teeth, and pineth away: and I spake to thy disciples that they should cast him out; and they could not. He answered him, and said, O faithless generation, how long shall I be with you? How long shall I suffer you? Bring him unto me. And they brought him unto him: and straightway he saw him, straightway the spirit tear him: and he fell on the ground, and wallowed, foaming. And he asked his father, How long ago is it since this came unto him? And he said, Of a child. And oftimes it hath cast him into the fire, and into the waters to destroy him: but if thou canst do anything, have compassion on us and help us. Jesus said unto him, If thou canst believe, all things are possible to him that believeth. And straightway the father of the child cried out and said with tears, Lord I believe; help thou mine unbelief.
>
> When Jesus saw that the people came running together, he rebuked the foul spirit, saying unto him, Thou dumb and deaf spirit, I charge thee come out of him, and he was as one dead; insomuch that many said, He is dead. But Jesus took him by the hand and lifted him up; and he arose. And when he was come into the house, his disciples asked him privately, Why could we not cast him out? And he said unto them, This kind come forth by nothing but by prayer and fasting.

Aside from the intrinsic interest of this anecdote, there is the noteworthy revelation that to the author of these verses at least, the Hippocratic idea was dead, for epilepsy was again a dumb and deaf spirit, (not a little difficult to exorcise with such advantages). Practically the same series of events is to be found in Matthew, XVII, but Mark seems to have been the more conservative raconteur, since Matthew remarks, "and the child was cured from that very hour."

Discovery of the aura of epilepsy has been credited to a number of characters, among them Pelops and his student Galen, though Hippocrates spoke of it in unmistakeable terms. It appears, however, that Archigenes of Apamea, A.D., 54 to 117, who practiced medicine in Rome during the reign of Trajan, was the first to specifically describe the aura as a distinct entity. His conception of the mechanics of the fit was hampered however by his knowledge of anatomy, for like the Stoics, Archigenes placed the seat of the soul in the heart, not unnaturally making the explanation of any phenomena of the sensory nervous system a matter of considerable difficulty.[8]

Aretius,[19] 2nd and 3rd century, A.D., in his writings combined acute observation with superstition. He was a follower of the humoral theory, and as shown in the following extract, he did not distinguish clearly between epilepsy and those epileptiform convulsions consequent upon other conditions.

> Epilepsy is a very dreadful disease and puts on various forms, its paroxysms are terrible, very acute and destructive, for sometimes one attack proves mortal. But should the patient, through great care, sustain the force of the disease, he drags a life of pain and ignominy, amidst nastiness; it does not easily quit its hold, but its thralldom is felt at some of the best and most beautiful periods of life; it attacks equally both boys and youths, sometimes however it is fortunately got rid of at a more advanced age, and vanishes at the flower of life, but then it leaves some deformed, and destroys the beauty of youth, either by rendering their hands useless, distorting the face, or depriving them of some of their senses. When the malady has taken deep root it baffles the skill of the physician, nor is it removed by any change of age, but lives and dies with the patient. Sometimes the disease, from convulsions and distortion of the limbs and eyes, is attended with excessive pain and the mind is affected with mania. The sight of the paroxysm is truly melancholy and the termination is attended with shame, from the spontaneous flow both of the faeces and urine, besides, the form and origin is beyond belief for some imagine it that it is sent from the moon as a judgment upon the impious, hence is derived the name *Sacer morbis* which it may likewise have obtained from other reasons, perhaps from the magnitude of the disease, it being customary to call everything great by the name *sacer*, or from the cure not being effected by human, but divine power, or from the appearance of the man being possessed with a daemon, and it is not improbable that all these conspired to affix the appellation. If the disease is of long duration, the patients are not without danger even in the intervals; they are torpid, dispirited, dejected and shun all intercourse with men nor does age render them more mild in their nature, they are wakeful and troubled in their sleep with many strange fancies, they have a detestation of food, bad concoction, their color disappears and their countenance is of a leaden hue, torpor of mind and insensibility render them slow of perception, they are dull of hearing, and there is a buzzing noise in the head; their speech is perplexed and the tongue falters either from the tendency of the disease, or wounds which it hath received during the exacerbation; it is convulsed and twisted different ways in the mouth; sometimes too the disease disorders the understanding to such a degree, that a total infatuation takes place. The cause of these affections is an excess of cold conjoined with moisture.

Aretius' remark that "it sometimes, however, is fortunately got rid of at a more advanced age and vanishes at the flower of life" was probably prompted by those cures which do occur spontaneously in some cases at middle age. His comment that it "then leaves some deformed and destroys the beauty of youth either by rendering their hands useless, distorting the face or depriving them of some of their senses" gives one the impression that he has confused a number of other afflictions with epilepsy. These phenomena are not today considered an integral part of the epileptic condition although the association of feeblemindedness with epilepsy has been a matter of profound studies, primarily by the psychiatrists. There appears to be no basis for the statement that it "is attended with excessive pain" though the appearance of the patient during convulsion would naturally lead one to this belief. The statement that "their color disappears and their countenance is of a leaden hue" may well be taken as one of the earliest observations of the accompanying cyanosis, but that the patient may be dull of hearing is much in doubt, as well as that the faltering of the tongue is a consistent accompaniment. His observation that "there is a buzzing noise in the head" is interesting but possibly pertains only to the aura, or what is more likely, to an early observation of tinnitus accompanying brain tumors productive of convulsions. As may be seen, not much time was wasted on the pathology of the disease. One valuable observation made by Aretius which has been taken from another translation[141] reads: "Whenever the disease occurs, and has already seized a finger, or is commencing in any part, (the patients) having from experience a foreknowledge of what is to happen, call from among those who are present upon their customary assistants, and entreat them to pull aside and stretch the affected member." This is an early observation that fits, in all likelihood Jacksonian, which begin by spasms may often be effectually stopped in another way, by forcibly preventing the movement.

Whether or not Pelops, A.D. 100, was the first to describe the aura, he was the first to call it such. According to Galen, whose master he was, he was struck by the fact that the sensation with which many attacks begin, commencing in the hand or foot, apparently ascends to the head. This sensation having been described to him by his patients as a "cold vapour," he suggested that it might really be such, passing up the vessels then believed to convey air. Hence he termed it πνευματικήἄνρα, "spirituous vapour." This notion of the peripheral origin of aura was maintained until recent times although with the discovery of the functions of the vessels and the nerves, its seat was transferred to the latter.

The association of Galen with Hippocrates as a great physician is a familiar one in medical histories. In regard to epilepsy, however, Galen did what nearly everyone since has done. His aim seemed quantity not quality. He takes the unassuming observations of Hippocrates and complicates them with his own abstruse inaccuracies. As the complexion he gave to medical thought was scrupulously preserved for nearly fourteen hundred years, omission of his work, however inaccurate, is unthinkable. His views bearing on epilepsy hardly justify comment:

> Epilepsy is also a convulsion of all the parts of the body, not continuous, like emprosthotonos, opisthotonos and tetanus, but manifesting itself by seizure. It is not only in this respect that it differs from the convulsions of which we have spoken, but also by the injury to mind and senses, which proves clearly that this affection is engendered in a higher region, in the brain itself. But as its seizure ceases promptly, it is more probable that a thick humour produces the affection, in obstructing the ventricles (*canaux de pneuma*) and that the source of the nerves is itself stirred to carry away the obstructing matter. Perhaps also, the origin of each nerve being moistened, epileptic convulsions are produced as are those which spring from the medulla. The invasion of epilepsy

is as sudden as its disappearance, indicating that the affection never results from dryness and vacuity, but always from the consistency (*consistence*) of the humour. In reality, sudden obstruction of the openings can be produced by a thick or viscous humour if the brain, or the thin membrane in which it is found, come to such a state of dryness that the parts are nearly like leather; such a condition is only known to occur after a long period of time. Add to this that the patient can neither see, nor hear, nor exercise any of the senses, nor even comprehend what goes on, and that besides his mind is injured, together with the faculty of memory. All these facts prove that the affection has its origin in the brain, humour obstructing the passages of the psychic air (*pneuma psychique*) which is found in its ventricles. . . . Like the thick humour of phlegm, this thick atrabiliary humour often produces epilepsies when it is retained in the openings of the ventricles of the brain, median or posterior . . . Melancholics ordinarily become epileptics and epileptics ordinarily become melancholics. The one or the other of these affections produces itself in preference according to which the illness takes the one or the other direction. If it directs itself toward the body, one becomes epileptic, if toward the intelligence, melancholic. This passage indicates besides that not always, but frequently a transformation from one to the other of these affections takes place. In effect, epilepsy being produced not only by atrabiliary humour, but also by phlegmatic humour, that which is engendered by atrabiliary humour sometimes transforms itself into melancholy, and that which is engendered by phlegmatic humour changes itself into another affection . . .

It is necessary to distinguish carefully the epileptic affections, for they come on, sometimes following a primary affection of the head, and sometimes by sympathy. Indeed, nearly all doctors have neglected to distinguish the epilepsies, which present three varieties, as they have neglected to distinguish three kinds of melancholy. Epilepsies all have this in common, that the brain is affected, be it that the affection has arisen there, as happens in the majority of epileptics, or that from the orifice of the stomach, called ordinarily στομαχcoς by doctors, it be risen by sympathy to the brain. There manifests itself, more rarely, another form or kind, or variety of epilepsy, . . . the affection commencing in any part whatever, then ascending toward the head in a manner perceptible to the patient himself. As a young man I saw this phenomenon, for the first time, in a boy of thirteen years; I had seen him with the most distinguished doctors of my part of the country, gathered for consultation on the treatment. I heard the child tell that the symptoms had begun at the leg, and from there had ascended directly to the neck by the thigh, and iliac region, the ribs and the neck to the head, and that as soon as it reached the head, he lost consciousness. Questioned by the doctors upon the nature of this substance which ascended to the head, the child could not answer.

Another young man, who was quite intelligent, able to understand what passed with him, and more apt to explain it to others, answered that a sort of cold breath mounted in him. My master, Pelops, believed one of two things, that it was the ascension of one certain quality, ascension produced by the alteration of the contiguous parts, or that it moved from a vaporous substance. It is nothing astonishing, he said, that a humour engendered against nature in the affected part has an energetic quality analogous to that of venom of mischievous animals. Who would believe, in effect, if we had not often been made aware of the fact, that the sting of a scorpion or the bite of a spider, such little animals, should cause in the entire body such grave and extraordinary alterations, although the animal had introduced into the body such a small quantity

> of substance . . . Then we must suppose that there exists a vaporous or humid substance which, in slight volume, possesses great power . . . Pelops said then that it is not impossible that a like substance might be engendered in the body without exterior cause, which, after forming in one part of the nerves, mounts by continuity of its faculty to the origin of the nerves, whether it be that it produces an alteration, as I was saying, or that a vaporous substance, like a breath, carries itself into a higher region . . . It is not then at all impossible that the venom increases rapidly in the entire skin, from there passes by contact into each subadjacent part, then into other contiguous parts, then again from these last affected parts into others, until when it has arrived in every essential organ, the individual is in danger of perishing. The manifest usefulness of ligature applied in this case, to higher parts, leads me to adopt this point of view with regard to epilepsy . . . In the boy of whom I spoke earlier, epilepsy began with the leg. The consulting doctors tried to cure him. They advised him, after complete purging to apply on the part a poultice of wild carrot and mustard; they bound the member, besides, above the part first affected, and prevented thus the return of the seizure, which had been taking place each day . . .
>
> It now remains to look into the cause of epileptic convulsions which come on seemingly sympathetically . . . Having seen once an individual attacked by a sympathetic affection of this nature fall without violent convulsions, but troubled at intervals by slow, abrupt movements, it appeared to me probable that there was something similar to what one often sees produced in the orifice of the stomach in the case of hiccups . . . I have seen in the fit of epileptics seized by a sympathetic, not idiopathic affection of the brain, a manifestation not of continual convulsion but of a sort of jerky movement, returning at intervals, of such a kind that I imagined it to produce in the brain a movement similar to that which often contracts the orifice of the stomach, incommoded by certain substances. In effect, that being surcharged with nutriments, or irritated by their alteration, it appeared tormented by hiccups . . . There is nothing astonishing in the seat of the nerves being so agitated that it forcibly carries away all that ascend to it from the originally affected part. It seems to me, further, that all the other symptoms which agitate the nervous system come on in this way, and that those which lead to a fit with loss of feeling, without convulsive movement, result from a sudden chill.[20]

For centuries Galen dominated medical thought, perhaps because he was not given those centuries in which to advance it. Many say he retarded thought with his many inaccuracies. The fault lies not with dead Galen but with those living men who made up the following centuries.

The first available source among the post-galenics is Aetius,[21] *c.* A.D. 500, who was royal physician to Justinian I and produced copious writings of the Byzantine school. Much of his work, especially that on epilepsy was taken from Archigenes, through Philumenus. It was considered more accurate than that of Aretius, whose source was the same. He treats of "Epilepsia or Morbus Comitialis from Galen," "Dioscorides on Epilepsy," "Care of the Old and Young Who are Vexed by the Morbus Comitialis of Poseidon," "Cure of Decrepit or Crippled of Epilepsy from Poseidon," titles which indicate Aetius' unprogressive standpoint.

As to Coelius Aurelianus (490–583) I quote Pirkner's recent work:

> Coelius Aurelianus (490–583) added new traits to the history of the prodromes, regarded the disease in its relation to

hysteria and for the first time, in his book, mentioned an apoplectic variety in which the syndrome resembles sleep. None before him had discussed the therapy with more thoroughness and understanding. His chapter on treatment is more complete and instructive than the writings of authors centuries later.

Another follower of Galen, Alexander Trallianus,[23] A.D. 525 to 605, was a much-travelled practitioner who finally settled in Rome. He appears to have been the only one of the Byzantine physicians who showed much originality. Unfortunately his cures were often disfigured by the usual Byzantine spells and charms. His ideas as to the cause of epilepsy were brief and vague:

> It will be shown that epilepsy (*comitialis*) is of three kinds; it may originate in the head, exactly; it may come through ill effect of constriction of the opening of the ventricles (which are called stomachus) or it may arise in certain other parts of the body. If *comitialis* comes from crowding of the opening of the ventricles, (*stomachus*) the stomach is convulsed and there is a tremor . . . an access of *comitialis* may be brought on by eating too much, or by indigestible food.

He described a case in which the attacks commenced with a sensation beginning in the back of the foot and ascending to the head. The fits were arrested by creating an issue on the part from which the attack seemed to start. The treatment by local blisters thus indicated was employed to a great extent by physicians in the 17th and 18th centuries.

Paul of Aegina, A.D., 625–690, noteworthy as he seems to have been in the history of medicine, added nothing to Galen's opinions on epilepsy.

The oldest documents of Salernitan medicine are compilations in barbarous Latin from the later Roman authors and pseudo-authors, and date from the first half of the 11th century. Among the Salernitan writers was Lombard Warimpontus, or Gariopontus (died *c.* 1050). Sudhoff says that his compilation is probably not Salernic, but Byzantine, dating back to the 8th or 9th century.[33]

> There are generally two epilepsies. One is that sudden one in which there is unconsciousness, contractions of hands and feet, and tremors of the brain; the other is that in which they froth and snort and the members are not contracted as told above—this the vulgar say is demoniacal. But in these it is felt from a part, in the others there are no senses. These causes come from blood that is viscid, it is bitter and vitiated by brown (black?) bile. With such a mixture, the stability of the brain, in which the spirit has its dwelling, falls into confusion (f.5).[26]

A notable inconsistency is that further on he says, in accord with the other writers of his day, "there are three kinds of epilepsy, analepsia, catalepsia, and epilepsia. Analepsia, it is said, is that in which the sacred parts of the head lose their senses. It comes from neglect of the stomach, either from too much food, too much luxury, or too much coitus, or from indigestion from over-eating" (ideas which were only recently stricken from the literature).

" . . . if they are not cured at the source, the stomach, they become epileptics. Epilepsy, it has been said, is an oppression of the mind and of the senses . . . This passion (?) may come from too much food, or from too much heat, or from an infusion of the brain, or from intoxication." (See modern work on alcoholic epilepsy.)

> Catalepsy is an epileptiform passion with fever that is not epilepsy; which froths at the mouth and nose as in epilepsy one does not . . . from these signs we know epilepsy: from the spasm and confusion when all senses leave and all motion, with pallor, relaxed mouth, halting respiration, heavy pulse, palpitation of members, rolling of the eyes, stupid aspect, whistling through the teeth, weakened voice and remissions.

(All in all these signs give us the most accurate and complete picture of an epileptic convulsion up to this period, especially in calling attention to the heavy pulse and remissions.) His conclusion is too indefinite to be noteworthy: "There are two epilepsies, one with tremor and sleep, . . . which cannot be cured. The other without tremor and sleep, which can be cured."[26]

Haly ben Abbas, the Persian mage, who died *c.* A.D. 994, is most remembered for his canonized treatise, which was authoritative until Avicenna. His ideas of epilepsy were essentially Galenic: "It was seen that from the right arm to the head a cold air or vapor ascended and the patient fell and had an epileptic convulsion . . . an evil ascended in the interior of the body from the thumb to the head." He continues to say, "It is necessary . . . to dry up the superfluous moisture which is found in the cerebrum." He held to the theory that changes in temperature affect epileptics, and prescribed many drugs such as peony, cascara, mirrh, etc., for treatment. He held to the then current version of humoral pathology, recommending purging and fasting, saying, however, "those to whom epilepsy occurs rarely are restored."[27]

The "Prince of Physicians," Ibn Sina or Avicenna the Arabian,[28] was a convivial Omarian spirit, court physician to many caliphs in his day. In his texts the modern medical word epilepsy is first used according to Pirkner. His unwieldy compendium, the "Canon" became the fountainhead of medical knowledge in the Middle Ages. This ponderous work contained much learning but unfortunately retarded for generations the policy of first-hand observation. He adopted the Hippocratic notions of *animus* and *anima* as mentioned previously. To give a free translation of his comments:

> Epilepsy is a sickness which prevents animation of the members, the operation of the senses, movement, and standing erect, and that is because of obstruction, and the greatest cause of this is from a harmful substance coming to the anterior ventricles of the cerebrum. Then it causes the obstruction to go forward and prohibits passage of the virtues of the senses in it and in the limbs, and it comes about entirely and universally . . . and since every spasm, as I have shown, comes out either from fullness or dryness or from contraction, on account of an impeding cause, then so likewise with epilepsy. But nevertheless it does not come from dryness, since it is sudden, while a dry spasm is not sudden, and since the cerebrum does not bring about great spasms from dryness; rather the body does first. Then the cause must be contraction for expelling either vapor, or irritant or evil substances or humour, which causes the obstruction to vanish (and a spasm which is not rigid), making the humor come into the ventricles of the brain and origins of the nerves . . . And since this happens from the spasmodic motions disturbing that humour or on account of boiling over of superfluous heat into it, which comes about from the obstruction, wherefore the virtue of the senses cannot cross into its natural channel . . . or on account of wind obstructing the passage

> of the breath, as Aristotle saw to be one of the causes of epilepsy . . . and epilepsy more often comes from phlegm, and is in the cerebrum itself. But when it occurs in one of the members, a moist, putrid vapor rises into the cerebrum, and this may be from any part of the body, from fingers, feet, hands.

Albucasis,[29] c. A.D. 1000, after recommending various drugs and potions, says, "do not cauterize unless the patient is of the phlegmatic type," thus by inference supporting the old theory.

At practically the same time in England the use of cramp-rings for curing epilepsy was beginning. Here the conception of epilepsy must have reverted completely to the divine, through the influence of the church. The most efficacious treatment possible was the wearing of a silver cramp-ring which was supposed to relieve the sufferer from epilepsy as long as he wore it. Cramp-rings were for the most part made of silver acquired at a communion service; many, however, were made of coffin-nails, or even from pieces of navel-string (Lupton). All these rings and their supposed cures date back to a legendary ring of Edward the Confessor. Briefly, the legend has it that Edward the Confessor while dedicating a church to St. John the Evangelist gave his ring to a beggar who asked for alms. The beggar was revealed as St. John himself, and according to Crawfurd, this legend explains the synonym *Morbis Sancti Ionnis.* The ring was returned to Edward endowed with miraculous powers and was buried with him in Westminster Abbey in 1066; being later exhumed it served as a nucleus for numerous cramp-rings. The complete fascinating legend may be found in Caxton's "Golden Legend" (Crawfurd).[30]

At a slightly later time, c. A.D. 1100, there was written in the Orient the "Syriac Book of Medicine." Though the date is uncertain and the actual author unknown, it is found that the book comprises the greater part of a work on human anatomy, pathology and therapy as formulated by Greek physicians and according to Budge, accepted by certain Syriac physicians. "The perusal of the Book of Medicine will convince the reader that he has before him in Syriac dress a series of lectures . . . which were written in Greek by a learned and distinguished physician who was a convinced follower of Hippocrates" (Budge[31]). So far as references to epilepsy are concerned, one is immediately struck with the fact that the Syriac discussion is a complete and accurate translation of Galen, even to his specific case reports. Besides this there are the "Heira of Archigenes" and the "Great Heira Leghûdhâya," which contain intricate vegetable medicines or panaceas including epilepsy among their cures.

Another reference to the state of epilepsy in England, for the first time under the name "falling sickness," is from the "Ancren Ruele,"[32] c.1200, beginning: "*Fallinde veul ich cleopie lecomes sicnesse,*" which is taken from the following more complete translation:

> . . . Another property, which is good for an anchoress, although it is hated; that is the falling sickness. For it is very necessary for an anchoress of holy and pius life to have the falling sickness. I do not mean the sickness which is *commonly* so-called, but that which I shall call falling sickness is an infirmity

of the body, or temptation of carnal frailty, by which she seems to herself to fall down from her holy and exalted piety. She would otherwise grow presumptuous, etc. . . .

In the Middle Ages it was customary to regard eight diseases as contagious according to the pseudo-Salernitan verse cited by Bernard de Gordon, 1307, the idea of which derives from Rhazes[101] (Singer):

Febris acuta, ptisis, *pedicon*, scabies, sacer ignis
Anthrax, lippa, lepra nobis contagia praestant.

"*Pedicon*, according to Sudhoff's translation is epilepsy. The notion of epilepsy as contagious sprang, Sudhoff thinks, from the ancient Assyro-Babylonian concept of seizure by demons (*sibtu*) (see previous reference) the *ἐπαφή* (contagion) of the Greek papyri of 77–350 A.D. as applied to the sacred disease (*ἱερα νογος*) of the Hippocratic Canon" (Garrison[33]).

Ionnus Actuarius, last of the Byzantine writers, followed the humoral theory faithfully, according to the following remark, "Certainly if humors occupy the cerebrum as said before, they bring about sleepiness, torpor and epilepsy, and the most efficacious aids and great care are necessary."[34] He then discusses heat in food, and the relation of humours to that heat.

John of Gaddesden,[35] 1280–1360, (possibly the original of Chaucer's "Doctor of Physicke") was the author of the "Rosa Anglica," of which he was according to his own prologue, greatly enamoured, but which Guy de Chauliac called "a vapid rose, devoid of fragrance." It is a collection of the traditional ideas of Haly Abbas, Serapion, de Gordon and Galen, together with old wives' remedies of the countryside, and it contributes nothing further to the study of epilepsy. Such remarks as, "epilepsy is of three kinds, true, truer, and truest, . . . they are minor, medium and major . . . " are indicative.

About this time (1398) epilepsy was first appearing in England under its now accepted name, then epilency (Trevisa).

As an example of the completely reactionary superstitious view of epilepsy, there is an interesting prayer unearthed by Sudhoff from folio Codex 303, "der Amplonianischen Bibliotek Zu Erfurt;

> Contra morbum caducum stant zu sinen vozen, de da gewallen is,. nim wywasser wie sine lurze hant inde sprich: ich gese her dat gewigide wasser in deme namen unz herren iesu christi, de untfangin wart zu Nazarecht; dar na gise wasser in de regchte hant, inde spreche: Ich gisse dich her in deme namen unser herren iesu christi, de geborin wart zu Bethlehem. Darnach begese den minchen up sin anclicze inde spreche: Ich begese dig in deme namen uns herren iesu christi de gemartelt wart zu Gerusalem. Darna sal he den minchen grifin mit deme gordele in treckin in up unde sprechin: stand up in deme namen uns herren iesu christi de upstund van deme dode, inde halde den minchen also lange, bis he sich versinne na der zigt un besteyt id in nummer me van Godis haluen-Amen.

Jean Fernel, "the modern Galen" (1497–1558), gave a thorough account of epilepsy. He was the physician attending upon Catherine de Medici. A judicious scholar, able writer, profound philosopher, this independent thinker produced a most complete treatise on epilepsy and differentiated with precision the various categories of the disease. His valuable consultations give an idea of the intelligent principles and rational clinical deductions upon which Fernel based his therapy (Pirkner[136]).

Jean de Renon, a scholar of the 15th century, wrote that, "The emerald can not only preserve from the falling sickness all those who wear it, set in gold, on a finger, but also can fortify the memory, and resist the forces of carnal lust."

Excerpts from Montagnana,[36] Savonarola,[37] Guainerius,[38] of whom Montagnana was of Padua, and the latter two of the Montpellier school, were found to be mostly exact, entirely unoriginal repetitions of previously noted works on epilepsy.

Even on the verge of the Renaissance, epilepsy was still considered to be a contagious disease. "The fact that an isolation hospital and home for epileptics was founded at the cloister of St. Valentine at Rufach (upper Alsace) in 1486 shows that the disease was still regarded as contagious in accord with the old pseudo-Salernitan verse" (Sudhoff,[6] Garrison[33]).

At the time of the rising of the Renaissance spirit, the study of epilepsy and of medicine in general seems to have been still overshadowed by theological doctrine, and the result was, at least in the case of epilepsy, a retrogression to pre-Hippocratic thought. With the Rennaisance came the beginning of modern anatomy, especially through Vesalius, while surgery advanced through Paré. Then came Paracelsus' violent reaction against the Galenic tradition, (and incidentally the contribution of a refreshing definition of epilepsy, for according to Josat[143] "it is, to use the words of Paracelsus himself, the earthquake of the microcosm, the microcosm in revolution, and the result of this revolution is the effervescence of vital spirit, or epilepsy"). The study of epilepsy did advance, but superstitious defence against such an awful disease was hard to uproot. The term comitial disease still obtained in English (Bulleyn, 1562, Sylvester, 1598, Burton, 1692[54]). In 1607 Topsall recommended against the "falling sickness" the "gall of a ferret."[54] One marked advance was that the aura was pointed out as being only the commencement of the fit, not its cause. This, though not generally recognized until the 19th century was pointed out as early as 1607 by Erastus.[39] More rational drugs were being generally used, though as at the present time no useful specifics were found. Parkinson, speaking of foxglove, (vertue or digitalis) says, "It hath beene of later experience found also to be effectualle against the Falling Sicknesse . . . " In his "Herbal," under Tillia; The Lime or Linden Tree he says: "the flowers of the Lime tree, and of Lilly Comally, being distilled together, the water of them is much commended against the falling sickness; the distilled water of the barke is of the same effect."[40]

At about the same period of time the Japanese applied the moxa, "a tuft of soft, combustible substance to be burned upon the skin" (Dorland[139]), of plant origin[140] as a cautery on the head "et lavent avec de l'eau salee la partie qu'ils ont cauterisee" (and wash with salty water the part which they have cauterized[136]).

The observers of epilepsy were beginning to divide it into different types on a more rational basis than heretofore. In 1649 *epilepsia cursiva* was noted by Boëtius.[41] There is also a sarcastic allusion, probably to hysteria, which may even then have given rise to the diagnostic difficulty it still presents to doctors who "could never cure her falling ill, which takes her when she pleases" ("Woman's Universe," 1652). That the therapy of epilepsy at least was not free from superstition is obvious: "Against the falling sickness, take a jay, pull off her feathers, and pull out her guts, then fill her belly full of Cummin seeds, then dry her in an oven till she be converted into a mummy" (possibly a substitution for the expensive Egyptian mummy of the period) "a dram of her being beaten into a powder, seeds and all, is an excellent remedy for the falling sickness, being taken in any convenient liquor every morning." (From Culpepper's "Last Legacy," 1685.[42])

Gorn[110] says that with the advent of Thomas Willis, 1621–75, the study of epilepsy for the first time progressed continuously and that this impetus was due to the acute pathological observations of Willis on the associated lesions, supplemented by extensive clinical observation. It was in this same period that the epoch-making discoveries of Harvey, 1578–1657, were made, laying the foundation for much of the later work on epilepsy. With the advent of Boerhaave,[43] 1668 to 1738, marked advances in the study of epilepsy occurred. Although Boerhaave admits of bleeding and intoxication epilepsy, besides eclampsia, he was quite alive to the pathological changes in the brain. In *epilepsy exquisitissima* he noted that when a given incident produced epilepsy in one individual and not in another, a peculiar condition of the brain must be present in that one suffering from epilepsy.

> Illa vera causa internu, quae haeret in corpore epileptico, potest deciconstantissima; quamvis enim saepe sit sine allo effecte physico, tamen hoc facit, ut homo, accidente aliae causa, sit epilepticus, quae alia causa nihil fecessit in homine alio; hanc epilepticam diathesim vocamus pregumen et haec distinguit epileptiam ab omnibus morbis aliis. ("Praefectiones academicae de morbis nervorum."[43])

This disposition he considered to be constantly with the patient, hence the recurrence of attacks. In this predisposition epilepsy differed from all other diseases. It might lie latent the whole life, or appear at any time, especially in youth. Though his localization was faulty, (and justly so) the mechanics as stated were quite logical. He said that: "Epilepsy is a disease of the 'sensorium communi' and the affection is such that the working part where the sensation grows conscious, is entirely abolished, while the place where the muscular movement (of the voluntary muscles) arises, is irritated abnormally by some stimulus of unusual strength."[44] He sought the cause of epilepsy in a pathological condition of the cerebrum, which condition in a violent attack might spread to the medulla oblongata and cerebellum often producing death. He advised that in examining the etiological conditions there be a strict separation of the causes which occasioned the *mira dispositio interna epileptica* and those which give rise to the awakening of this epileptic diathesis. Therefore Nothnagel was not the first to differentiate between these two.[44]

To Boerhaave heredity was one of the most important factors producing this epileptic diathesis (which may skip generations). However, in accord with the tendency of his day, he believed that the violent emotions of the mother could produce intrauterine epilepsy (of the child) or that epilepsy might be produced if the child were procreated during or shortly before the menstrual period. He also included among causes fright (*ab epilepsia remotissimo*), lasting trouble, (superimposed on diatheses it was a cause of nocturnal epilepsy), cranial abnormalities such as those produced in delivery, meningeal changes, overdosage of mercury, and ischuria. He gave a detailed account of Hippocrates' opinion that an excess of intracranial mucus might be productive of idiopathic epilepsy, the fit, in these cases, being the result of extreme efforts at removal of the abundant pituita. He granted the presence of the fluid in nine-tenths of the cases, but refused to accept Hippocrates' modus operandi, believing the edema to be resultant rather than causative. He used *epilepsia exquisitissima* in various senses, referring to the acute form of epilepsy, but it may be interpreted that he means by *epilepsia exquisita* a central epilepsy produced by an hereditary pathological condition of the cerebrum. Idiopathic epilepsy seemed to mean to Boerhaave a central epilepsy, that is an hereditary or acquired abnormality of the brain, combined with the central destruction secondarily produced by affections of the peripheral nerve spheres. Excitants might be of any type but recurrences would be most likely to result from those of similar type to the original.

He also thought that epilepsy might be a result of plethora and that a plethoric condition was greatest in full and new moon. He followed the theory that epilepsy might be excited by pregnancy, coitus, worms, bile, and obstructions. As an example of his powers of observation, it is to be noted that he observed the patient to be unconscious during the cry. More important still, he realized that all epileptics do not show the classical onset, but suffer from accidental spasms and curious symptoms, which are only recognized as epileptic in origin by their connection with the other symptoms and their tendency to appear periodically. This showed a clear recognition of the existence of *petit mal.* In his discussion of this subject he clearly differentiated between *petit mal*, hysteria, and feigned epilepsy (in which he said the eyes are closed, while in true epilepsy they are never entirely so). A great deal of suffering would have been averted had the practitioners of his day and following, realized with him that a disposition to epilepsy may depend upon so many different conditions, that it is illogical to seek one remedy which would do for all cases. Further, he did not make the mistake of looking on any one symptom as a constant accompaniment of the affliction. This in itself was of extreme value to the advancement of the study of epilepsy.

After Boerhaave epilepsy began to be more closely observed, its study branching into a great tangle of observations. Josat[143] claims that one who contributed greatly to the popularization of the idea of epilepsy as a demonic disease was Jean-Joseph Gassner, (b. 1727, Braz, Switzerland) who had studied the affliction in himself without being able to determine a cause. He wrote on demoniac medicine, as did Jean Westphal, in whose "Pathologia Daemoniaca" (1707) epilepsy was termed *Morbus daemoniacus.* The 18th century saw no really constructive advance in the study, but a great reservoir of observations was slowly accumulated. The year 1700 opened with an interesting case of convulsions starting in the groin and passing down the leg, recorded by Bonet.[45] Many unilateral phenomena were also recorded. Unilateral aura attracted much attention from the time of Aretius, and Herpin,[75] 1852, has collected a series of instances from Aretius, Galen, Alexander Trallianus among the Greeks, and Ali Rodehan, Brassavola, Sylvius, Farentinus, Dovinctus, and Hollier, among the writers of the 16th century, of cases commencing with an aura in the hand, foot, calf, face, etc. These were also studied by Bravais, 1824. The best reference on this subject is to be found in Hughlings Jackson.[124] As early as 1705 Vieussens[46] reported a case of tumor of the hypophysis with amaurosis and epileptiform movement. Andree,[47] 1749, studied *epilepsia cursiva.* In 1781 another reference to changes of the hypophysis in epilepsy was cited by Greding.[48]

By 1782 references from William Heberden[49] show that though the pathology of epilepsy was still little understood its treatment and general consideration were on a much more rational basis. His comment on epilepsy will be found in the introduction. He continues: "It is not unusual to have a little warning of some of the first fits, and afterwards to have them come on without any previous sign." Among other remarks are the observations that: the occurrence is extremely variable, ranging from those cases in which several fits occur in a day to those which may lie dormant as long as thirteen years; that children are more liable, but get rid of the attacks more easily than adults; that male cases predominate; that it is to some degree hereditary; and in this regard its powers may be spent before it reaches the children. A marked advance is embodied in his advice not to confuse epilepsy with the usual childhood convulsions. His treatment was quite reasonable and outstandingly humane for that period. During the fit the patient was not to be molested, all treatment being administered before or after. Bleeding was prohibited as well as purging, which were thought to aggravate the cause. In an extremely cautious vein he ventured that wild valerian root might be useful in some cases. His admonitions to avoid terror, liquor, and "intemperate use of women" hint at confused etiology but sound hygienic principles. (Extensive and valuable work is now being done on the emotional and alcoholic aspects of epilepsy.)

With the dawn of the 19th century the study of epilepsy was well on its way toward the confusion in which it is now found. Innumerable writers propounded their theories in rolling phrases, and countless experimenters flew at each others' throats. Its study advanced along increasingly divergent lines; practically every possible organ was incriminated, while all the known pharmacopeas might have been labelled, "cures for epilepsy," so indiscriminately were medicaments used. It is only possible for the writer to choose a few of the more conspicuous opinions from the resulting welter of conflicting ideas. The reader is referred to the masterly critical review of important research work done on epilepsy by Prevost and Samaja,[77] reviews to be found in Echevarria,[56] and the résumé by Lennox and Cobb.[60]

Wengel,[80] 1810 to 1811, was a forerunner of Harvey Cushing (see Hippocrates on pituita) in attributing epilepsy to changes in the pituitary, which gland he considered most important and in 1811 he reported the case of an epileptic in whom the infundibulum was reddened and inflamed. This same year Odier made the important observation that the ligature of a part will stop a fit if it be due to a cerebral tumor.[73] Fritsch, 1838–91, and Hitzig, 1838–1907, were the first to show that local bodily movements and convulsions can be produced by stimulation of definite areas in the brain, always identical in different animals of the same species, and that, *per contra*, removal of these areas will produce paralysis or loss of function of the corresponding parts of the body. This was the basis on which some of the most likely modern work was founded.

Solly,[74] 1847, foreshadowed the many vascular theories of later date. He considered the cause of the paroxysm to lie in a determination of blood to the head, in an arterial congestion resulting from increasing heart action with simultaneous paralysis of the muscular coats of the arteries of the head. His theory was plausible, but his evidence was valueless.

Marshall Hall[51] (1851) was the first to propound the explanation of paroxysmal nervous discharges as produced by the spinal nervous system.

> A class of diseases of the nervous centers, inorganic in their origin and paroxysmal or recurrent in form included not only apoplexy and paralysis but these and epilepsy and mania as one and the same disease, differing only in degree. Apoplexy affects the cerebrum, paralysis the hemispheres, epilepsy the medulla oblongata and mania like apoplexy the cerebrum. Their causes may be centric, or eccentric (emotional, or diastolic, or reflex).

Hall thought (rather confusedly) that: all these act on the medulla oblongata which is the center of excito-motor power; the emotions act on the cervical muscles directly, and the irritations spinally; that there were two great types of epilepsy, *epilepsy mitior* (produced by trachelismus) and *epilepsy gravior* (produced by laryngismus). If the stage had not advanced beyond trachelismus the condition might be relieved by tracheotomy or venesection. "Epileptic attacks like every direct or reflex action of the spinal system, are always excited." Marshall Hall was, besides, the first to notice the connection of anemia with epilepsy and to deduce that epilepsy was produced by anemia of the medulla.

Brown-Séquard,[52] 1860, states:

> The spinal cord in animals may be the cause, not the seat of an epileptic affection. That there is a mysterious relationship between certain parts of the spinal cord and remote parts of the skin of the face and neck. The epileptiform convulsions may be the consequence of slight irritation upon certain nerves. That the trunk of a nerve may not have the power of producing convulsions whilst its ramifications have. That even when an epileptic affection has its primary cause in the nerve centers some cutaneous filaments of nerves, not directly connected with the injured parts of these centers, have a power of producing convulsions; that other nerves, even directly connected with them have not.

He held that the seat of epilepsy might be variable and epilepsy itself might be produced by the excitation of the whole cerebrospinal system. Unconsciousness he considered to be produced by contraction of blood vessels of the brain and consequent accumulation of venous blood charged with H_2CO_3 which had a specific action on the brain. Though stating that asphyxia was a result of the fixed state of the chest he contradicted himself by advocating holding the breath as a relief. Radcliffe,[66] 1864, in the same vein as Brown-Séquard attributed the asphyxia to a removal of the arterial blood from the brain but not to the presence of venous blood.

With the advent of Schroeder van der Kolk,[50] histological examination took a major part in the localization theories. In 1859 he confirmed the medullary view of the ultimate seat of epilepsy. His careful microscopic examinations revealed supposed cellular changes in the medullary ganglia and an abnormal vascularity which might occur also in the forebrain. On this basis he was led to state that the proximate cause of epilepsy was an exalted action of the ganglion cells on the medulla whose cells were exhausted by their overactivity and in need of regeneration, thus explaining the remittent attacks. He thought that this excited action extended to the vasomotor nerves of the brain thus causing anemia and consequent unconsciousness, which latter it was incorrect to suppose preceded the attack. There were necessary to the production of epilepsy an increased excitability, "a commonly augmented determination of blood," and some chemical change in the latter. If the attack were of long duration an organic vascular dilatation was produced, more albumin exuded from the dilated vessels, and their increasing hardness and subsequent fatty degeneration and softening rendered the patient incurable. These observations on the nervous vascularity are strongly suggestive of arteriosclerotic or syphilitic changes rather than any condition peculiar to epilepsy. It is remarkable that while he recorded anemia of the brain, he also recorded a vascular dilatation, especially of the cortex, stating that the small ganglion cells were perhaps compressed thereby, perhaps partially by the increased albumin content.

As early as 1733, Van Swieten,[126] had acknowledged very distinctly the medulla oblongata as the efficient cause of epilepsy. ("Verum illi motux musculares produci nequeunt, nisi causa muscularis motus ab encephalo per nervos veniat ad musculos; adeoque causae pilepticum paroxysmum producens debet efficere, ut medulla encephali in nervorum origines validissimas tantorum motuum causas derivet.") Portal,[61] in 1827, also incriminated the medulla oblongata which he considered to be "the common center of all sensations." His observations, however, were based upon traumatism due to a bullet, and in all probability referred to Jacksonian epilepsy.

By 1861 the conception of epilepsy in a more modern garb of protective generality was stated by Russel Reynolds.[65] He said that the immediate cause of the convulsions is the same in all instances and that there is a change in the nutritive and "interstitial processes of the nerve centers." Yet immediately following this the old humoral theory reappeared in contemporary garb. Todd,[63] 1857, in a series of statements based on practically nothing forwarded the view that epilepsy was caused by a "morbidly disturbed polarity" producing a toxin which was the cause of the symptoms according to the locality of its action. However, no toxin has been demonstrated to date, although much work has been done on the subject. An early view of the supposed generation of this poison and its action may be found in the *Medical Times and Gazette* of August 5, 1854, page 129. Todd's only attempt at localization was a vague statement that the tubercula quadrigemini were involved. Foville,[125] showing that loss of consciousness occurred previous to congestion, was one of the first who rejected the Hippocratic idea of congestion as the immediate cause of epilepsy, as continued by Hall.

Trousseau,[67] 1866, followed Foville's line of thought in stating that the sequence was first, a cerebrospinal modification, and secondarily a cerebral congestion. Provost and Catard,[127] 1866, returned to the congestion theory on the newer basis of embolism and thrombosis. Their theory was based on the experimental observation that though convulsions are not produced by large emboli they may be produced by a finer and more general thrombosis. They supposed this to result in a hyperemic condition. Echevarria,[56] 1870, objected to this, saying, "No higher degree of cerebral hyperemia could be found than in those dying of algid cholera and yet there is no impairment of mind, unconsciousness or convulsions to be observed." Henle,[62] 1855, one of the best observers in the neurological field, also attributed epilepsy to pressure of blood in the cerebral vessels. Kussmaul and Tenner,[53] 1850, contradicted the cerebral plethora theory for the first time by their interesting vascular experiments with animals. The same physiologists showed on the contrary that "sudden arterial anemia of the brain, as also faradization of the cervical sympathetic nerves, which determines permanent spasm from the blood vessels gives rise to epileptic fits. Nutrition is thus suddenly impeded, and the brain brought into that peculiar internal condition which is manifested in the form of an epileptic attack." Their principal points were:

> That a circumscribed anatomical alteration of the brain must not be regarded as a proximate cause of an epileptic attack. That this proximate cause cannot be one of long duration, but an alteration merely of a temporary kind. It can be no visible alteration of the brain anatomically demonstrable, that can act as the cause of epilepsy. That epileptic convulsions can be brought about by contraction of the blood vessels induced by the vasomotor nerves. Lastly it must be borne in mind that pathological anatomy can give but little information as to the origin of epilepsy. It only supports the supposition to which all the symptoms of epilepsy already point, that this origin is to be sought in the brain. But, as it would seem in our researches, on the nature of epilepsy, this is more vigorously supported by etiological forces and the great importance of the *traitement morale*. Physiological experimentation alone furnished reliable information.

Despite these statements they did attempt certain localizations, saying that epileptic convulsions proceed from excitable districts of the brain behind the optic thalami, probably the medulla oblongata, as it is the origin of the constrictor nerves of the glottis as well as the vasomotor nerves. They believed that anemia of those parts of the brain anterior to the crura cerebri brought about unconsciousness, insensibility and paralysis in man, and that if spasms occurred with these symptoms some excitable parts posterior to the optic thalami must be involved. They said, furthermore, that circumscribed cerebral lesions may predispose to epilepsy but will not cause it directly.

Radcliffe,[66] 1864, believed that the muscular contraction of epilepsy, as well as normal contractions, were natural mechanical processes, consequent upon a release of electrical energy having nothing to do with the inherent energy of the tissues. These obscure views, now outdated, were based upon his interesting theories of muscular and nervous energy.

The confusion continues with Echevarria and Falret. According to Echevarria, Falret,[64] 1859, localized the essential seat of epilepsy in the higher cortical centers in contradistinction to the reflex centers of the encephali, but unfortunately presented no supporting evidence. Echevarria,[56] 1870, himself defines epilepsy thus:

> a disease constituted by chronic paroxysms, excited upon a direct or reflex action of the medulla oblongata, in a condition of exalted irritability coincident with a sudden depression of the cerebral circulation and with loss of consciousness with or without muscular spasms . . . I am led to admit that the medulla oblongata is the original seat of epilepsy, and that the disease primarily involves the vasomotor nerves.

Regarding this latter, even a casual observation of his book shows a distinct lack of histological evidence while his figures of vasomotor changes show them to be primarily syphilitic with an admixture of arteriosclerosis. Summing up his pathological observations: the cranium may be thick or thin; the meninges may exhibit various types of pachymeningitis; "the degenerations of the brain (cerebrum and cerebellum) are not primitive with idiopathic epilepsy . . . The changes undergone by the brain are but accidents in the course of epilepsy, the primary lesions of the disease being in the medulla oblongata;" There may or may not be brain changes with epilepsy but there is always damage to the medulla oblongata; the regions apt to be first encroached upon, in order of frequency are (1) floor of the third ventricle, (2) corpus striatum, (3) optic thalami, (4) convolutions of the grey substance, and (5) peduncles of the cerebellum. Unilateral hypertrophy may be present but is not essential to epilepsy, while microscopic examination reveals hyperplasia of connective tissue elements which is due to constitutional malnutrition consequent upon circulatory derangement. A revealing statement of his is that fatty degeneration of the cerebral cortex is most striking when the epilepsy is caused by chronic alcoholism. Echevarria's rather sterile observations were typical of the time (excepting always the work of Gowers); but he did leave behind a clue to possible productive work in the chemistry of epilepsy. This is that he claims that in cases of epilepsy with paralysis there is an immediate absence of cadaveric rigidity and early putrefaction of the paralyzed muscles.

A slight hint shows that during all this earnest scientific endeavor, the dark forces of reaction were not dead, for in the year 1852, in a book published at Paris, "Du Prognostic et du Traitement de l'Epilepsie," *poudre de Neufchatel*, or fried mole, was recommended as a highly successful cure for the disease.

In 1881 Sir William Gowers[54] published his treatise on epilepsy which, especially from the clinical viewpoint is still the standard work. Even here there is little of the pathology, his explanations being primarily physiological. He was the first to notice the basic principle of the epileptic convulsion, i.e., that it is tetanic in nature and that it is more or less purposive, being due to actions of muscle groups (Introduction). One of his basic clinical observations was that "a single convulsion, however characteristic, does not constitute epilepsy." His whole conception of epileptic attacks was based on a theory of normal balance with continuous overflow of nervous energy. "In epilepsy, however, the equilibrium is apparently unstable, and a sudden release of energy occurs apart from the normal stimulus, in what we term 'spontaneous discharge.' The tendency to it must depend on some slight difference in the molecular constitution of the nervous structure, inherited or acquired." (But we have in epilepsy) "an abnormal form of activity in association with undue readiness to act." As to localization, he says that "the lesion which is the cause of organic epilepsy" (which he differentiates from true idiopathic epilepsy) "is always in or near the cerebral cortex and generally in or near the motor regions . . . In all cases, however, the morbid process of discharge promotes its recurrence, and does so in any part of the brain to which it may spread, whether it is the result of a general nutritional disposition or consequent on local disease." On this basis he considers that organic epilepsy may come to resemble what he calls idiopathic epilepsy.

> Persistence of attacks due to such causes (eclampsia of children, etc.) is always facilitated by an inherited tendency to the disease, and this is also true of their occurrence . . . the search for the causes of epilepsy must thus be chiefly an investigation into conditions which precede the occurrence of the first fit. The excitant is like a spark which falls harmlessly on a heap of sand, but on gunpowder induces an explosion.

Gowers' views appear to have been the most rational up to and including his time.

The ancient question as to inheritance of epilepsy appears to have been settled conclusively (?) in "A First Study of Inheritance in Epilepsy" published by Davenport and Weeks[11] in 1911. Their evidence is based primarily on statistical and genetical observation over a considerable period. Their conclusions in summary are:

> Epilepsy and feeblemindedness show a great similarity of behavior in heredity, supporting the hypothesis that each is produced by the absence of a protoplasmic factor that determines complete nervous development. When both parents are either epileptic or feebleminded all their offspring are so likewise. Normal parents that have epileptic offspring usually show gross nervous defects in their close relatives. While we recognize that "epilepsy" is a complex yet there is a classical type numerically so preponderous that, in the mass, epilepsy acts like a unit defect. Our data point to a poisoning in a slight degree of germ cells by alcohol, but the evidence is hardly crucial.

The long-standing question of the pituitary factor (see Hippocrates), though not concluded received great impetus from the work of Harvey Cushing,[16] 1912.

(1) Horsley, it will be recalled, in his first experimental hypophysectomy in canines observed no postoperative changes. They were used subsequently as subjects of cortical stimulation and he noted that the motor cortex was

unusually excitable. (2) We have observed the tendency to epileptiform convulsions in a number of our animals kept for a long period after partial hypophysectomy, animals that ultimately exhibit symptoms which we attribute to glandular insufficiency. (3) Study of a series of hypophyseal disease in man has shown that epilepsy, a symptom unobserved in states of hyperpituitarism, is a frequent accompaniment of clinical conditions in which an insufficiency of the gland is manifested. Moreover, that the brain under these circumstances is possibly over-excitable is suggested by the number of individuals in whom gustatory attacks have occurred under the influence presumably of a direct local irritation of the adjacent uncinate cortex by the enlarged gland. (4) Epilepsy is a frequent sequel of cranial injuries. In certain types of injury, as the common bursting fractures of the base, the pituitary is prone to be damaged. (5) If, as we believe to be the case, the posterior lobe secretion normally enters the cerebrospinal fluid and thus comes to be in solution in a fluid which subsequently bathes the cortex it is possible that its diminution from hypophyseal disease or injury may unfavorably affect the activity of the cortical cells. [Recent work on the circulation of the pituitary body negates this view.] On this basis it is conceivable that a local scar which involves, or a tumor which presses on, a given area of the cortex may prevent the access to the cells of a substance which is essential to their functional stability. (6) Many individuals supposed to be suffering from so-called genuine or essential epilepsy present manifestations of a nutritional disorder—a tendency to adiposity and a high sugar tolerance coupled with a lowered temperature and pulse-rate closely akin to the constitutional disorder which characterizes hypophyseal deficiency. In some of these individuals the administration of hypophyseal extract has served to moderate the seizures from which they previously suffered.

Harvey Beck,[58] 1922, says:

> . . . attention has been called by Cushing to the relation of epileptiform seizures to lesions producing hypopituitarism. So-called uncinate attacks are caused by a lesion extending into the interpeduncular region producing pressure on or irritation of the uncinate gyrus. These cases have an aura characterized by hallucinations of taste and smell. Occasionally gustatory and olfactory phenomena are associated with temporary loss of memory. At other times attacks are more complete with marked convulsive seizures. General epileptic seizures which occur without uncinate factors are probably produced by glandular insufficiency the result of hypoplasia.

Dandy,[59] though stating that brains of epileptics show lesions which are so inconsistent as to seem coincidental, says:

> . . . with a considerable degree of uniformity in epileptic operative cases I have found: (1) dilatation of the ventricles, (compensatory for atrophy, often producing mono-hemi-, or diplegia) (2) collections of fluid on the surface of the brain. These collections of fluid indicate to my mind that there has been a loss of brain tissue, in amount at least equal to quantity of fluid. (3) Pockets of fluid in the brain substance, (4) softening of the brain in connection with (3) above, (5) induration of the brain (fibrosis and gliosis), (6) meningeal changes, (7) congenital malformations.

He has observed these changes to occur more often over the motor cortex and less often over the occipital and frontal lobes, of which the frequency is greater in the frontal while the temporal is scarcely affected at all. "The brain beneath these collections of fluid is softer than the contiguous normal brain." He considers this fluid to be the result, but Alexander considered the edema (effect) to be the cause (cerebral atrophy). "But these changes in the meninges and the enlargement of the subarachnoid spaces cannot be dismissed with the statement that they are the result of the convulsions, for many of the most severe cases of epilepsy (the congenital type) do not have an increase of fluid" (Dandy).

He concluded with the statement:

> . . . the relationship of cerebral lesions with epilepsy can be compared with cerebral tumors in regard to epilepsy. Of the tumors in different individuals apparently in the same locality and of the same type, one will produce epilepsy while the other will not. There are also surely great differences in the susceptibility of different individuals to convulsions, and doubtless there are differences in the intrinsic characters of the lesions, although with our coarse methods of examination they may look alike.

If a brief comment on all the foregoing may be permitted, it may be said that it almost takes the form of a rather lengthy, complicated parable. And the parable is, in its essence, that in the beginning epilepsy as a study was in the hands of those who knew not, but knew not that they knew not. Then it seemed a fairly simple, quite explainable affair, revealed in the soft light of ignorance. Throughout its existence it has passed through many phases until now, perhaps, it finds itself in the hands of those who know not, but know that they know not, when if the old proverb in the Book of the Fathers is true, there is hope, despite the many modern theories.

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BIBLIOGRAPHY

1. Chipault. Chirurgie du Système Nerveux, 1894.
2. Muskens, L. J. J. Epilepsy: Comparative Pathogenesis, Symptoms, Treatment. N. Y., Wood, 1928.
3. Wreszinski, W. Der Londoner Medizinische Papyrus und der Papyrus Hearst, etc. Leipzig, 1912.
   Der Papyrus Ebers. Leipzig, 1913.
4. Reisner, G. A. Hearst Egyptian Exp. Vol. 1, Medical Papyrus.
5. Briggs, I. G. Epilepsy, Hysteria and Neurasthenia. London, Methuen, 1921.
6. Sudhoff, K. *Arch. f. Gesch. d. Med.*, 4; 353, 1910–11. 6: 449, 454, 455, 1912–13; 12: 1910, 1920–1922.
7. Avinash Chandra Kaviratra. Tr. Charaka-Samhita. Pt. 7, pp. 212–15.
8. Moon, R. O. Hippocrates and His Successors. London, Longmans, 1923.
9. Adams, F. Complete Tr. of Hippocrates from the Greek, Lond., Sydenham Soc., 1849.
10. Copland, J. Dictionary of Practical Medicine. Epil R. Lond., Longmans, 1835–58, p. 789.
11. Davenport, C. B. *N. Y. Rec. Office Bull.*, No. 4, 1911. *J. Nerv. & Ment. Dis.*, 38: 601–70, 1911.
12. Stahl, deH. Disposition and Affect.
13. Aristotle. De Partibus Animal., II, 7.
14. Lusitanus, Zacutus. Prax. ad Mir., I, 36.
15. Dumas. Physiology. 4: 23.
16. Cushing, H. Pituitary and Its Disorders. Phila., Lippincott, 1912.
17. Lucretius. De Rerum Natura. III, 486–504.
18. Celsus, Aurelius Cornelius. Tr. by Alex. Lee. London, 1836, pp. 225 et seq.
19. Aretius. Morbus Chronicus. Tr. Sydenham Soc., London. Or: Morbus Chronicus, Tr. from original Greek by Moffat. Lond. Walter for Richardson, n. d.
20. Galen. De Locis Affectis. Tr. by Charles Daremberg. Oeuvres Anatomiques,

Physiologiques, et Médicales de Galen. Paris, Bailliere, 1856. cap. ix et seq., pp. 561 seq.

Hippocrates and Galen. Tr. J. Coxe, Phila., Blakiston, 1846.

21. Aetiiamideniquem Alii Antiochenum Vocant Medici Clarissimi. Libri in tres tomes divisi. Basiliae, 1535.
22. Wiberg, J. Galen's advice for an epileptic child. *Bibliot. f. Laeger*, Copenh., 8: 8, 1907.
23. Trallianus. A. De Singulorum Corporis, etc. Basle, 1533, p. 41.
24. Susruta Ayurveda Samhita. Com. in Dallana: Nibandha Samgraha, Calcutta, 1891.
25. Hoernle, A. F. R. Studies in ancient Indian medicine. *Roy. Asiatic Soc. J.*, 10: 283, 1906.
26. Gariopontas. Vestuti Admodum Medici at Totius Corporis Aegritudines Remediorum. Lib. i, cap. vi, vii, fol. pp. 5, 5b, 6, 6b, 7, Basle, 1531.
27. Haly ben Abbas. Liber Totius Medicinae, etc. Lib. v, fol, pp. 215b, 216a, 1523.
28. Ibn Sina or Avicenna. Liver in re Medica Omnes; Canon Lib. iii, fen. i, Tract v, cap. 8–10, pp. 484–485, Venice, 1564.
29. Albucasis Chirurgica. Octavii Horationi rerum Medicarum, Schottum (Strassburg), Lib. iv, 1532.
30. Crawfurd, R. The Blessing of Cramp-ring; chapter in history of treatment of epilepsy. Stud. Hist. and Meth. Sc. Oxford, 1917, pp. 105–187.
31. Budge, E. A. W. The Syriac Book of Medicine. Tr. Oxford Univ. Press, 1913.
32. Morton (edit.) Ancren Ruele. Cambridge Soc., 1853.
33. Garrison, F. H. Introduction to the History of Medicine. Ed. 4. Phila., Saunders, 1929.
34. Actuarius, Ionnus, filii Zacharius. Methodi Medendi. Lib. iv, Venice, 1554, p. 124.
35. Gaddesden, John of. Rosa Anglica. Pavia, 1492, fol. pp. 75b, and 76.
36. Montagnana, Bartholomeus. Consilia, fol. pp. 66b, 67a, Venice, 1499.
37. Savonarola, J. M. Practica. Tract vi, Cap. i, rub. xx, Venice, 1497, fol. pp-65b & 669.
38. Guainerius. Incipit Tract. de Aegritudine Capitis, Tract vii, Cap. i, Pavia, 1481. fol. pp. 21a, 22b.
39. Erastus. Disput. de Med. Nov. Paracelsi *ca.* 1580.
40. Parkinson. The Theatre of Plants. 1640. Herbal. 1640.
41. Böetius. Observationes Medicae de Affectis Omissis. London, 1649.
42. Culpepper, N. Last Legacy. London, 1685.
43. Boerhaave, H. Praelectiones Academicae de Morbis Nervorum. Bassini, 1782, 3: 773.
44. Stigter, D. Boerhaave and epilepsy. *Janus*, Vol. 6. 1901.
45. Bonet. Sepulchretum. Vol. 1, Sect. 12, 1700.
46. Vieussens, R. Novum Vasorum Corporis Humani Systema. 1705, p. 248 et seq.
47. Andree. Cases of Epilepsy, etc. 1749.
48. Greding, C. G. Ad Cavolum Gottlieb Kussmanium episte. 16 pp. Lips. ex off. Saal pachia, 1781.
49. Herberden, W. Commentaries on the History and Cure of Diseases. Boston, 1782, Cap. 33, pp. 126, 1818.
50. van der Kolk, Schroeder. On the Minute Structure of the Spinal Cord and Medulla Oblongata; On Epilepsy tr. London, New Sydenham Soc. 1851. Art. Epilepsie in Dict. de Méd. & Chir. Pratiques, Paris, 1831, 7: 421.
51. Hall, M. Synopsis of Cerebral and Spinal Seizures of Inorganic Origin and Paroxysmal Form. Ed. 2, of Outline of Croonian Lect. London, 1851. Apercu du Systeme Spinal. Paris, 1855, p. 138.
52. Brown-Séquard. Physiology of the Central Nervous System. Phila., 1860, p. 179. Researches on Epilepsy. 1863, pp. 55–75. *Dublin J. M. Sc.*, No. 78, p. 434, 1865.
53. Kussmaul and Tenner. Moleschotts Untersuchungen, Vol. 3: 1857. On Epileptiform Convulsions from Haemorrhage. London, New Sydenham Soc., 1859.
54. Gowers, Sir W. Epilepsy and Other Chronic Convulsive Diseases, Their Causes, Symptoms and Treatment. London, 1881. Heredity in Disease. Roy. Soc. Med. London, Longmans, 1909.

55. Binswanger, O. Die Epilepsia. Nothnagel. Spec. Path. y. Therpa. 12; 1 Halfte, pt. 1, 1899. Die Epilepsie. Ed. 2, Holder, Wien, 1913.
56. Echevarria, M. G. On Epilepsy, Anatomo-Pathology, etc. N. Y., Wood, 1870.
57. Johnston. Radiography of pituitary in its relation to epilepsy. *Am. J. Roentgenol.*, 4: 172, 1919.
58. Beck, H. Dystrophis Adiposogenitalis. Endocrinology and Metabolism, N. Y., Appleton, 1922, 1: 901.
59. Dandy, W. E. The space compensation function of the cerebral spinal fluid, its connection with cerebral lesions in epilepsy. *Johns Hopkins Hosp. Bull.*, 34: 1923.
60. Lennox, W. G. and Cobb, S. Epilepsy from the Standpoint of Physiology and Treatment. *Medicine*, 7: No. 2, 1928.
61. Portal, A. Observations sur le Nature et le Traitement de l'Epilepsie. Paris, Bailliere, 1827, pp. 159–187.
62. Henle, J. Handbuch der Nationale Pathologie. 1855, 2: pt. 1; 181; pt. 2, p. 46.
63. Todd. Clinical Lectures on Paralysis, Certain Diseases of the Brain and Other Affections of the Nervous System. Ed. 2, London, 1857, p. 299.
64. Falret. *Arch. Gen. de méd.*, Paris, 1859.
65. Reynolds, R. Epilepsy, etc. Churchill, London, 1861, p. 12.
66. Radcliffe, C. B. Lectures on Epilepsy, Pain, Paralysis, etc. Phila., Lindsay & Blakiston, 1866, p. 90.
67. Trousseau. Lectures on Clinical Medicine. Tr. by P. Victor. London, Bazire, 1866, p. 36.
68. Charcot. Etudes Physiologiques et Pathalogiques sur le Ramollissement Cerebral. Paris, 1866, pp. 6 and 131.
69. Bouchut. Du Diagnostic des Maladies du Système Nerveux. Paris, 1866, p. 377.
70. Shanahan, W. T. *An. Rep. Craig Colony*, 1911–12.
71. Peterman, M. G. *J. A. M. A.*, May 5, 1928.
72. Barborka, C. J. *Trained Nurse*, Dec., 1928.
73. Odier. Manuel de méd. Pratique. Geneva, 1811.
74. Solly, S. The Human Brain, its Structure, Physiology, and Diseases. Ed. 2, London, 1847.
75. Herpin. Du Prognostic et du Traitement de l'Epilepsie. Paris, 1852.
76. Jackson and Coleman. *Brain*, 1899.
77. Prevost and Samaio. *Rev. Méd. la Suisse rom.*, No. 2, 1904.
78. Magnan. Recherches sur les centres nerveux. 1876.
79. Alexander. Neue Breslauer Sammlung aud dem Gebiete der Heilk. 1829.
80. Wengel, J. (1810) Cited by Frankel Hockwart, *Wien med. Wchnschr.*, pp. 59, 2127, 1909. Observations sur le cervelet et sur les deverses parties du cerveau dans les epileptiques. Trad. de Breton, 1811, p. 216.
81. Althaus, J. On Epilepsy, Hysteria and Ataxy. London, Churchill, 1866.
82. Allen, D. P. Traumatic defects of the skull. Their relation to epilepsy, etc. *Clin. Path. Papers Lakeside Hosp.*, Cleveland, s. 3, 1908.
83. Smith, S. Marriage laws of states in regard to epilepsy. *Bull. Univ. Wash.*, 1914.
84. Garnett. *Am. J. M. Sc.*, Nov., 1927.
85. Mohr and Staehelin. Berlin, Springer, 1925, v, vol. 2, pt. 1, p. 1340.
86. Caelius Aurelius. De Morbus Acutis et Chronicus. is, iiis.
87. Haeser. Lehrubuch der Gesch. der Med. 1875, 1: pp. 177 seq.; p. 213, line 13.
88. Prout and Clark, P. In: Spratling: Epilepsy and its Treatment. N. Y., 1904.
89. Alexander, W. The surgical treatment of some forms of epilepsy. *Lancet*, Sept. 30, 1911.
90. Fere, C. *Rev. Méd.*, 16: 115, 1895.
91. Bleuher, E. *München. med. Wchnschr.*, 33: 789, 1895.
92. Alzheimer. *Monatschr. f. Psychiat. Neurol.*, 4: 1898.
93. Sieveking, E. H. On Epilepsy and Epileptiform Seizures. London, Churchill, 1861.
94. Post Aristotelian Treatise. De Moro Sacro. In: Collectio Hippocratica. Ed. Littré, vi, 352 Aphorism., sect. ii, p. 45, 57, e. c. iv, 482, 534, and Praedicta, Lib. ii, p. 9, 10, e. c. ix, 28.

95. Celsus. Liv. iii, cap. 23, Ed., Basel, 1556, p. 62.
96. Aretaeus. Morbus Chronicus. Lib. i, cap. iv, Ed. Kuhn, Leips., 1828.
97. Aurelianus (Soranus). Morbus Chronicus. Lib. i, cap. iv, Ed. Amstelod., 1755.
98. Galen. De Locis Affectis. Lib. iii, cap. ix, seq. Ed. Kuhn, viii, 173, p. 194, "aura epilepticus," 1535, and Comment in Hipp., Epid., vi, cap. 12, Ed. Basel, 1535.
99. Trallianus, A. Lib. i, cap. 15, pp. 35, & 41. Basil, 1551.
100. Paulus. Lib. iii, cap. 13, Basel, 1544.
101. Rhazes. De Re Medica. Lib. ix, cap. ii, Basel, 1541.
102. De Renzi. De aegritudine curatione. Lib. ii in: Collat. Sernit., Napol., 1853.
103. Villanovus, Arnaldus de. Breviarvum Practicae Medicinae. Lib. i, cap. xxii, p. 14, Opp. Basel., 1494.
104. de Gordon. Lilium Medicum, De Passionibus capitas. pt. ii, cap. xxv, Ludg., 1574.
105. Guilelmus de Saliceto. Summa Conservationis. Lib. i, cap. xv, Venet., 1502.
106. Varignana. Secreta. Tract i, cap. 8, fol. 17b, Lugd., 1534.
107. Ferrario, Mattheo (de Gradi). Practica "De egritudine cerebri," cap. viii, Venetia, 1508.
108. Dinckgreue, J. De Epilepsia, von der Schweren Noht am 40 Marb. Catt., 1676.
109. Discursus de Epilepsia, das ist: Eine Kurtzusammen gefasste, jedoch ausfuhrliche Beschreibung von der grossesten Krankheit der Epilepsie, etc. Altenb., 1713.
110. Gorn, H. W. Historische Behandlung der Frage nach der Lokalisation der genuinen Epilepsie. Leipzig, Borna, 1911.
111. Heller, F. Pathologie u. Therapie der Epilepsia in Alterum. Berl., 1911; also *Janus*, 16: 589–605, 1911.
112. Metzgern, J. C. Schediasma spagyricomdeicum Naturgemasse Untersuching etc. Karlsruhe, 1721.
113. Phaedronus, G. Eleenus sive Perfecta Epilepsiae Curatio, ad Oswaldum ab Eck. Ingoldstat, 1562.
114. Ponze, Sancta Cruz, A. Praelectiones Vallisoletanae, in librum magni Hippocrates de Morbo Sacro. fol. Matriti, 1631.
115. Popoff, N. M. Epilepsiya v istorii Yevropi, xix, stolietya. (Epilepsy in the history of Europe during the xix century). *Kazan*, 1899.
116. Razetti, L. Epilepsia dol Libertadon, Caracas, 1916.
117. Meyers, E. L. Epilepsy, history, cause treatment. *Tr. Luzerne Co. Med. Soc.*, 12: 170–179, 1904.
118. Rudneff, V. I. Epilepsy according to views of ancient authors. *Navrol Vestnik, Kazan*, 20: 29–50, 1913.
119. Vires. Recherches sur l'epilepsie et sa definition. *Montpellier méd.*, 17: 313–319, 1903.
120. Van Wageningen, J. Drinking of human blood by epileptics. *Nedl. Tijdschr. u. Geneesk.*, 57: pt. 2, 1923.
121. Weygandt. Geschichte der Epilepsia. *Psychiat-neurol. Wchnschr.*, 4: 539–542, 1902–03.
122. Lieutaud, J. Historia Anatomico-Medica. Paris, 1767.
123. Abercrombie. Diseases of the Brain. Phila., Carey & Lea, 1831.
124. Jackson, H. *London Hosp. Rep.*, 1: 389, 1864. Epileptic aphamia with epileptic seizures on the right side. *Med. Times Gaz.*, Aug. 13, 1864. April 30, 1864, Oct. 3, 1863, p. 359.
125. Foville. Dict. de Méd. Chir. Pratiques. Art. Epilepsie, p. 521.
126. Van Swieten. Commentaria in Hermanni Boerhaave Aphorismos de Cognoscondis et Curandis Morbis. Lugd. Batavorum, 1753, 3: 401.
127. Provost and Catard. Etudes Physiologiques et Pathologiques sur le Ramollissement Cerebral. Paris, 1866, pp. 6 and 131.
128. Soury, J. Nature et localization des Fonctions psychiques chez l'auteur du traite de la maladie sacrée. *Ann. Med. Psychiat.*, pp. 93, 191, 1903.
129. Botten, G. C. Historical peculiarities concerning epilepsy. *Nederl. Tijdschr. v. Geneesk*, 66: 1922.
130. Rosetti. The epileptic seizure. *Arch. Neurol. Psychiat.*, 21: 731–894, 1929.
131. Clough. Plutarch's Lives. N. Y., Burt, 1849, 9: 105.
132. Loyola, Ignatius. Autobiography, 1491–1556. Tr. J. F. X. O'Connor, N. Y., 1900.

133. Paracelus. Lib. 1, pp. 487, 596.
134. Holmes, O. W. Medical Essays. Cambridge Univ. Press, p. 188.
135. Clark, L. P. Psychology of essential epilepsy. *J. Nerv. & Ment. Dis.*, 63: 575–585, 1926.
136. Pirkner, E. H. Epilepsy in the light of history. Ann. Med. Hist., n. s. 1: 453, 1929.
137. Preuss, J. Biblisch-talmudische Medizen. Berl., Karger, 1915.
138. Sushruta, Samhita. English tr. from original Sanskrit. Ed. by Kaviraj Kunja Lal Bhishgratna. Calcutta, 1916.
139. Dorland, W. A. N. The American Illustrated Medical Dictionary. Phila., Saunders, Ed. 15, 1929.
140. Artemisia. old German wermouta, i.e. anything that warms.
141. Aratæus, Lond. Sydenham Soc. Trans., 1856, p. 244.
142. Encyclopaedia Britannica. Ed. 13, N. Y. 1926, 1: 1018. Ed. 11, Cambridge, 1910, 9: 691.
143. Josat. Recherches Historiques sur l'Epilepsie. Paris, 1856, pp. 140–187.
144. Dunglison, R. Medical Lexicon. Ed. 3, Phila., 1842.
145. Culpepper, N. Herbal. 1640. Pharmacopoeia Londin ensis. Cole. Lond. 1653.
146. Crawfurd, R. The Blessing of Cramp-rings, etc., Stud. Hist. & Meth. Sc. Oxford, 1917, pp. 105–187.
147. Haggard, A. Devils, Drugs and Doctors. N. Y., Harpers, 1928.
148. Mousson-Lanauze. Epilepsie antique. *Paris Med.*, 24: (Annexe), 88, 1919.
149. Barois, R. Des Epileptiques de Genie dans l'Historie et la Litterature; precisions sur differentes modalites de leur epilepsie. Paris, 1922.
150. Woods, M. In Spite of Epilepsy, etc. N. Y., 1913.

THE SIGNIFICANCE OF THE SCIENTIFIC CONQUEST OF THE AIR FOR INTELLECTUAL FREEDOM

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BY scientific conquest of the air is meant, that attainment of proved knowledge about the air when unscientific and uncritical imagination was excluded from that part of natural philosophy that treats of atmospheric phenomena. You may ask why we should commemorate this conquest or why should we review this weary and painful struggle at a time when we are perfectly secure against authority that is unsupported by science. Suppose one were asked the question if all forms of natural philosophy have not been perfectly free since its secularization in the early part of the seventeenth century, and since the decline of monarchical authority in both church and state, and the growth of democracy in politics and religion.

The answer to these questions can be made only with some faltering and chagrin.

Huxley pictures natural philosophy in the time of Copernicus as a young athlete "that strode into the arena of thought and boldly challenged church and state and philosophy and common ignorance that masquerades as common sense."

It is true that three centuries of brilliant triumphs of experimental philosophy have won the philosophers and educated statesmen and silenced many of the stupid churchmen. But how about the common ignorance that masquerades as common sense? Has that enemy of science been silenced? Common ignorance championed by fluent speech is still a powerful enemy and under the shield of democracy can commit as much deviltry as in former times under the monarchies of church and state.

What drove the monarchs and ecclesiastics of former times to their dark deeds was the same force that makes the fundamentalists, antivivisectionists and Christian Scientists powers for evil today. And that is the tremendous force of organized common ignorance, an evil that cannot be corrected by free schools and free libraries. These free institutions may save the thoughtful, but how about the throngs of students in colleges and libraries who have not the power of consecutive thought? When their ineptitude is made articulate through smart writing, they easily win a following that becomes a great power in a democracy. To be convinced of this we have only to think of the recent performances of several legislative bodies that supposedly gave expression to the popular will. Democracy in Tennessee has entrusted the guidance of philosophy to the state legislature. Christian Science, which is nothing more than modernized witchcraft, is clamoring for recognition before all state legislatures, and organized popular ignorance under the guidance of the antivivisectionists has nearly persuaded many legislatures and nearly induced Congress to stand for philozoic love as opposed to philanthropy.

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*This article was presented for publication by Dr. Hoover's wife, Katherine Fraser Hoover, after his death.

If the supposedly cultured and educated adherents of Christian Science (who share the common ignorance of symptomatology) were to employ the logic of their premises, they would have to approve Cotton Mather's war on witchcraft. And in Connecticut a few years ago suit was brought for damages against a woman for harboring inimical thoughts toward the plaintiff who in all seriousness followed the teachings of Christian Science to its logical absurdity. In this particular instance the judge dismissed the suit. But suppose the plaintiff had controlled a large number of votes in one of our large cities, would we have been spared the ignominy that now disgraces the state of Tennessee?

Because we have democratized the administration of justice, life and property are less secure in the United States than in any other civilized country. When these two elemental functions of government are so poorly carried out how can we hope for success in the democratization of philosophy? Under mass influence of organized ignorance, the guidance of astronomy, cosmology, biology and medicine may be entrusted to a legislature that is not above the source from which its power is derived.

How do these powers of darkness gain their strength? How does democracy come to menace her intellectuals as did the autocrats of three centuries ago? It is under the pretense of serving religion, which has been defined as "a conception of the universe that makes for righteousness." But suppose the conceptions of the universe are fixed by a textbook of religion that was written when cosmology was in its infancy, what a free admission is given superstition, excessive belief, a dangerous enemy to critical progress.

A good test of Max Müller's definition of religion, just given, viz: "a conception of the universe that makes for righteousness," is to compare the hymn and other songs of Aknaton (Pharoah of Egypt nearly 1500 years B.C.) with the worshipful language of a modern scientist, Michael Pupin. Both contemplate the heat or force that is in the sun with equally worshipful and righteous attitude of mind but with widely different scientific views:

Opening lines of Aknaton's hymn:

The dawning is beautiful in the horizon of heaven,
Oh living Aton beginning of life!
When thou arisest in the Eastern horizon of heaven,
Thou fillest every land with thy beauty;
For thou are beautiful, great glittering, high over the Earth;
Thy rays they encompass the lands; even all that Thou hast made.
Thou art Ra, and Thou hast carried them all away captives;
Thou bindest them by thy love. Though Thou art afar, Thy rays are on Earth;
Though Thou art on high, Thy footprints are the day.

Michael Pupin:

Activity is life, in the broadest sense of this word. Death is cold but life is hot, and it is gross abuse of language to speak of cold facts of Science. It is such language that creates prejudice against science, representing its methods as well as its results as devoid of everything that fires the emotional side of man. Every physical fact has two terminals, one is in our consciousness and the other is in some distant star which is rejoicing in the blazing vigor of its youth. Just as the life activity of the early blossoms, and the honey-hearted fruit of the mellow summer season, has its origin in the life-giving breath of the heavenly bridegroom, the glorious sun, so every terrestrial activity, every physical fact, with one of its terminals anchored in our consciousness, can trace its origin to the life-giving breath of some heavenly bridegroom, some burning star. Just explore the path that leads from one of these terminals to the other, and you will discover on each side of the path those beauties which continually thrill the heart of a scientific man. Do that and you will never again speak of the cold facts of Science.

So it has been with seekers after truth that have intervened between Aknaton and today. Their conceptions of the universe have always made for righteousness.

Intellectually religion is democratic but science is intellectually aristocratic. When a textbook for one is made to serve as a textbook for the other, a conflict is inevitable. The fundamentalist seeks to use the Bible as a textbook on cosmogony, and the Christian Scientist seeks to use his ignorant and uncritical text on therapy as a text for religion. To the scientist they are equally stupid and hateful. Christian Science suppresses the one grace in Christianity that has made it survive and that is Charity.

Christianity has survived and continues vigorous not because of its theology or scheme of salvation, but simply because it has exalted Charity. Charity in all its aspects is the grace of Christianity and patience and uncompromising devotion to truth grace true science. When, however, superstition, the evil genius of religion and the child of impatient ignorance, gains a hearing, religion and science are both debased.

Primitive man was confronted with the mysteries of the heavens, of the atmosphere and of the earth. Common Ignorance, always impatient and timid, demanded and received an explanation that was put in the early Hebrew literature, which many centuries later was adopted as a scientific text for both science and religion. With the advent of Christianity, the horrors of sin were emphasized and a scheme of salvation provided that demanded intellectual surrender. The world became a prize for the possession of which a benign God and a malign God were contending. The heavens revealed the menacing finger or smiling countenance of God but man never suffered from astronomical phenomena. The heavens were the great tablet on which God recorded either his warnings or approval or disapproval of man's conduct.

With the air, however, the medium in which man lived, things were very different. Atmospheric phenomena were exhibitions of power in a medium that was invisible and imponderable. Air had no substance and could not be seen and yet exhibited such devastating forces. Who could direct these invisible and imponderable forces but the natural enemy of mankind, who was logically enthroned as prince of the powers of the air.

The fickleness of Providence and the insolence of Satan threatened unscientific man at every turn. Man was entrapped in a maze of prodigies and miracles, from which there was no escape but by acquiescence and unconditional surrender to the priestcraft, the only earthly power that could defend him against satanic intrigues. The devices of the priests should not be regarded as plans for deceiving men. They were demanded by the impatience of common ignorance. The priests could no more refuse the demands for this service than man could endure his ignorance with patience. Superstition, or excess of belief, was begotten of timid ignorance and was not imposed by the priests on an unwilling people. As we shall later see, after comparative freedom had been gained in both politics and religion, common ignorance still demanded war on witchcraft, and the unhappy victim was saved only through the courage of a judge who flouted the ignorant jury.

The astronomical conquest of the heavens began with Copernicus in 1543 and ended with Isaac Newton's mathematical proof of gravitation in 1682. From that time on, all astronomical phenomena were robbed of their terror. An eclipse or a comet no longer terrified man when astronomers could foretell the time of their appearance. Obviously they could no longer be signs of divine warning when the astronomers provided a schedule for their appearance. Few persons then as now could understand how the astronomer did his work, but the fulfillment of prophecies based on science was sufficient to win the confidence of all excepting those who hate knowledge.

Superstition concerning atmospheric phenomena was not abolished with the discovery of astronomical law. The air was still a mystery, it had no weight, it was an element capable of exhibiting caprice that could be explained only by satanic malice. How could the havoc of a tornado or the freak of a whirlwind be explained when barometric pressure was not understood? How could men perceive the exhibition of natural law in fog, rain, hail, and snow when the invisible solubility of water in air was unknown, and above all how could man be reconciled to nature's order in the terrifying lightning when all laws of electricity were unsuspected? At the end of the seventeenth century law and order presided in the heavens, but the caprice and whim of the devil and his agents dominated the atmosphere. The first step toward the introduction of order into atmospheric phenomena was the invention of the air pump by Otto von Guericke in 1641. Two years later Viviani proved the weight of air in an attempt to explain why water would not rise more than 32 feet in a vacuum. Viviani proved that mercury, weighing thirteen times as much as water, *in vacuo* would rise only one thirteenth as high as water.

Torricelli in the same year employed the mercury barometer to measure altitude. The word barometer, however, was first used in a communication in the *Philosophical Transactions* of London in 1665. This communication is believed to have come from Robert Boyle. How slowly this bit of knowledge spread and how long its use in medicine was delayed is shown by the lapse of thirty-eight years before it was employed to elucidate the mechanism of respiration. In 1679, thirty-eight years after the invention of the barometer, Borelli (a fellow countryman of Torricelli) for the first time proved that the diaphragm descended with its activation and the air entered the lungs during phrenic contraction as a result of lowered barometric pressure in the pleural cavity. Until this demonstration there had been a question whether the activity of the diaphragm was employed in its ascent to compress the lungs or in its descent to expand them.

How the want of knowledge about barometric pressure baffled the scientists of the seventeenth century is shown in John Mayow's mystification over the mechanism of respiration. John Mayow died about the time of Borelli's publication and only a few years before his death he made the following observations that are found in his book. Mayow[1] says:

> The lungs are placed in a recess so sacred and hidden that nature would seem to have specially withdrawn this part both from the eyes and the intellect, for beyond the wish, it has not been granted to any one to fit a window to the breast and redeem from darkness the profounder secrets of nature. For of all the parts of the body, the lungs alone, as if shrinking from observation, cease from their movement and collapse at once on the entrance of light and revelation. Hence such an ignorance of respiration and a sort of holy wonder. Still let me draw near to the inmost vitals and concerning so obscure a matter, make at least a guess.

Such a confession seems to us so remarkable in view of his clear vision about the element in the air that maintained all animal life. This substance Mayow called nitro-aerial gas, and said it also maintained a flame as well as life. His idea was that the entire air was absorbed by the blood in the lungs and by what we now call internal respiration the nitro-aerial element was appropriated. Mayow proved that fish breathe air in solution in the water, by allowing them to suffocate in water that had been boiled. He also showed that by varnishing an egg the chick would die because it was deprived of its air that entered the pores of the shell. He also said that the child in utero got its nitro-aerial gas from the placental circulation. The nature of a flame mystified him however. He wonders why a flame grows of its own accord. He says: "For if we are dealing with motion of two substances, when once set going they should seek an equilibrium, whereas the flame grows with proper feeding." The same mystification oppressed Voltaire, who in 1737 was busy weighing iron, hot and cold, and metals before and after calcination to learn how the element of fire affected their weights. In his Philosophic Dictionary,[1] Voltaire says: "May not elementary fire have properties of matter little known to us, and properties of substances entirely so? May it not be a medium between matter and substances of another kind? And who can say there are not millions of these substances? I do not say that there are, but I say it is not proved that there may not be."

The solution of the problem about the supposed element of fire which played so conspicuous a part in the Devil's dominions awaited the discovery of oxygen in 1771 by Joseph Priestley and the final proof of the nature of oxidation by Lavoisier in 1775. Until the fact of oxidation was discovered and modern chemistry set on its triumphant course, respiration was still popularly regarded as it was by Michael Servetus, who in the middle of the sixteenth century undertook (by anatomical dissection) to find in what part of the body the divine spirit came in contact with the human. The result of his labors was the discovery that the pulmonary blood vessels carried blood and not air, as was previously believed. The phenomenon of oxidation seemed so near discovery over a century before Lavoisier when Robert Boyle directed the focus of the sun's rays from a glass lens on gunpowder in a vacuum under a bell jar and found there was no explosion although the powder burned. John Mayow with all his clear insight concerning his nitro-aerial gas repeated the experiment, but the chemical process of oxidation could not be visualized until Priestley in 1771 isolated and collected oxygen. And the phenomenon of oxidation itself was disbelieved even by Priestley, who in a brochure written in support of the theory of phlogiston said that "Lavoisier's oxygen would go down in obscurity along with Mr. Davy's nitrogen." A strange prophecy from a true prophet, who denied the child of his own mind. When at this period (in 1800 A.D.) a leader of thought in natural philosophy clung to such a view, how much could we expect the common ignorance of the day to be enlightened by the experimental work of the philosophers? Is it not astonishing that the authority of scientific thought carried as much weight as it really did.

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[1] Alembic Club reprint, p. 183.

[1] Vol. III, p. 227.

Another fruitful source of superstition about atmospheric phenomena was lightning. Although lightning rods were used in Egyptian temples 1170 years B.C. the first suggestion of its electric source came from the English physicist, Wall, in a communication that appeared in the *Philosophical Transactions* of London in 1708 A.D.

In 1746 Johann Winkler of Germany offered the same explanation, but lightning remained a terrifying exhibition of divine wrath until our own Franklin by a simple and direct experiment proved the folly of this superstition that had oppressed men for so many centuries. Philosophers were superior to the superstition but the greater popular terror was not allayed until the simple and spectacular proof from the hands of a revered leader of thought assured the timid ignorance of the world that lightning was a natural phenomenon and could therefore not be a visitation of the wrath of God.

In the last quarter of the eighteenth century, when conquests of experimental science rapidly multiplied, James Hutton, a geologist of Edinburgh, expounded his theory of rainfall and other precipitations of moisture. Hutton for the first time conceived of the solution of water in air in an invisible form and explained how the saturation of air with water varied with temperature. The work of Hutton supplied the foundation for modern meteorology. Rain, fog, hail and snow became natural phenomena dependent on wind currents and temperature.

During the period from 1770 to 1800 the western world of Europe and America made tremendous strides in political, religious and intellectual freedom and greatly exalted man's assertion of his own dignity. The dates of the scientific discoveries here mentioned are significant when we try to learn just why belief in witchcraft, the most hateful form of superstition, subsided. It seems a very significant fact that in 1768 and 1773 we had about the last public avowals for belief in this superstition from two sources which we might have expected to have been illuminated by the great light that had been revealed in scientific progress. In 1768 John Wesley, whose followers numbered hundreds of thousands, said that "giving up witchcraft meant giving up the Bible," and in 1773 the Scotch Presbyterian clergymen in session unanimously deprecated the decline in belief in witchcraft.

It seems very probable that if the courts of justice had not been superior to the pressure of common ignorance, there would have been a revival of the superstition under these popular leaders. However, the collective faith in the natural philosophers of the seventeenth century and early part of the eighteenth carried sufficient authority to have all laws in England against witchcraft repealed in 1736, and the last trial in England for witchcraft by legal authority was conducted in 1712 when Jane Wenham was convicted of witchcraft by a jury, but the more enlightened judge scoffed at the whole mass of evidence and succeeded in preventing the execution.

After such events, which seemed to indicate that this terrible superstition had been abolished, why should we have highly educated men like John Wesley and the Presbyterian clergymen of Scotland pleading for a return to the superstition that was so clearly credited in the old and new testaments? Was it fidelity to the scientific teaching of the Bible or a desire to hold men submissive to their authority? It was neither; it was merely an expression of their endorsement of the common ignorance which they shared. None of them knew enough about natural philosophy to be impressed with the orderliness of nature's laws. But when the philosophers had accumulated sufficient evidence from their experimental work to give them faith in the universal orderliness of natural phenomena, they carried sufficient authority to win the influential men of intelligence to their side, and were able to shame into silence the few believers in this cruel superstition. In the middle of the seventeenth century, however, in England there were strong advocates for witchcraft among men distinguished for their learning. Although they contributed nothing to human knowledge, they wrote excellent English and were skilled dialecticians. There were two such men who were very influential, one a learned physician and the other a learned preacher, Sir Thomas Brown, the author of "Religio Medici," and Joseph Glanvil, who wrote many philosophical and critical dissertations. These men were contemporaries of Robert Boyle, John Mayow, Hooke, and Halley, and Isaac Newton, and although they must have shared the knowledge and known the spirit of these great men, they not only shared the vulgar superstition of the time but one of them (Glanvil) wrote a book in which he sought to accredit superstitions about ghosts and witchcraft. These two great men are illustrations of the fact that intellectual freedom and rationalism have been won not by the fine writers but by men who have contributed to human knowledge. The natural philosophers, not the poets and writers of great prose, have been the true liberators of mankind.

Sir Thomas Brown (in 1642) published his "Religio Medici," in which he pretends to a faith that can "believe the most improbable things," but he modestly adds that his faith is not "sufficiently robust to believe what he knows to be impossible." Brown believed in tutelar deities, and among other details of life in the spirit world he says:

> Those apparitions and ghosts of departed persons are not the wandering souls of men, but the unquiet walks of devils, prompting and suggesting us unto mischief, blood and villainy; instilling and stealing into our hearts that the

blessed spirits are not at rest in their graves, but wander solicitous of the affairs of the world. But that these phantoms appear often and do frequent cemeteries, charnel houses, and churches, it is because they are dormitories of the dead where the devil like an insolent champion beholds with pride the spoils and trophies of his victory in Adam.

Brown was certain of the truth of witchcraft, and in 1664 testified before Chief Justice Matthew Hale at the trial of Amy Duny and Rose Collinder that he was clearly of the opinion "that the fits were natural, but heightened by the Devil's cooperating with the malice of witches at whose instances he did the villainies." A few years later Brown published his "Pseudodoxia Epidemica," or enquiries into vulgar and common errors, in which he disposes of many of the common errors of the day. The sources of these errors he ascribes to "The common infirmity of human nature," "Erroneous disposition of the people," "False deduction," "Credulity," and "Supinity," "Obstinate adherence unto antiquity," "Adherence unto authority," and finally "Of the last and greatest promotor of false opinions, the endeavors of Satan." A strange mixture of scepticism and credulity in which credulity prevails where there is conflict with Hebrew or Christian mythology!

The other great leader of thought whom I referred to as a contemporary of Brown was Joseph Glanvil, himself a member of the Royal Society and probably the greatest preacher of his time, who evidently admired the intellectual virtue of scepticism in men like Boyle, Hooke, Halley, Mayow and Newton, but he turns the weapons of criticism about by asserting that vanity of opinion is exhibited by those philosophers "who set up their own opinions against the established authority of the church and institutes of religion."

After Glanvil's death in 1682, the same year as that of Newton, his book called "Sadducismus Triumphatus" was published. The title is equivalent to the "Sceptic Triumphant," or "Satan Triumphant." In this work is collected a mass of evidence on twenty-eight cases of supernatural happenings to prove the truth of witchcraft. A century later the whole material of this book was contemptible rubbish, not because theology had changed but because a sufficiently large number of men shared belief in the orderliness of nature's methods and a reverence for natural laws whose truth was established by the experimental method. The progress of Rationalism from the latter part of the seventeenth to the latter part of the eighteenth century was much greater than in any preceding hundred years.

It was during this hundred years that the experimental method proved the ponderability and chemical structure of air and the laws of solution of water in air and gases in water, the physiology of pulmonary respiration, the chemistry of oxidation, and the electric nature of lightning. In this period of one hundred years there were two mental impressions diffused among the learned and the unlearned. One was confidence in the inexorable orderliness of all atmospheric phenomena, and the second was disbelief in the power of any unseen agent to violate these laws. Man was for the first time at home in the air, the medium in which he lived. He was no longer menaced with the Prince of Evil whose dominion was the air.

Magic, sorcery, and witchcraft lost their terror and their charm.

After so many superstitions based on ignorance of natural law had been dispelled, men became more patient in their ignorance because phenomena that were perplexing or inexplicable came to be confidently regarded as exhibitions of uncomprehended nature and not as evidence for supernatural interference with natural law. Ignorance about a natural fact no longer arouses impatient timidity (the mother of superstition), but challenges man's intelligence to learn its cause.

Freedom to employ one's intelligence in such pursuits is comparatively modern and has been won by fearless men at great sacrifice. Time does not permit a review of the interesting and dramatic and even tragic lives of some of the great saints of science to whom we are indebted. Their lives are full of interest and instruction, and the history of their triumphs seems to me at least to indicate that the discoveries of chemistry and physics of the air had more direct influence in allaying superstition than all other scientific conquests. Then man finally learned his true relations to the medium in which he lived, and lost his fear of the unfriendliness of supernatural powers that had always plagued his life.

Among these saints who contributed to our intellectual freedom in solving the mysteries of the air are several martyrs, whose lives should inspire us with pious reverence and gratitude. They were not only seekers after truth in natural philosophy, but they were interested in advancement of all knowledge that promised to free the human mind. Servetus, who died at the stake; John Mayow, esteemed by few during his life and rescued from oblivion nearly two centuries after his death; Joseph Priestley, the mild and contemplative philosopher who was persecuted by the common ignorance of his day and came to America in advanced life, seeking an asylum at the very time when his friend Lavoisier was guillotined by his ungrateful countrymen: all justly claim our reverential study. In Paris now Lavoisier sits in honor and bronze behind the Madeleine, where all the world pays tribute with pious sentiments as they view the graceful monument erected to his memory. And in Birmingham stands an expiatory monument to Priestley that was unveiled in 1874, when Thomas Huxley made the following statement:

> The unspotted purity of Priestley's life, the strictness of his performance of every duty, the unostentatious and deep-seated piety that breathes through all his correspondence, are in themselves a sufficient refutation of the hypothesis, invented by bigots to cover uncharitableness, that such opinions as his must arise from moral defects. And his statue will do as good service as the brazen image that was set upon a pole before the Israelites, if those who have been bitten by the fiery serpents of sectarian hatred, which still haunts this wilderness of a world, are made whole by looking upon the image of a heretic who was yet a saint.

Men such as these were saints who exorcised the air of its myriads of fancied devils that enthralled the minds of our ancestors. Let us be grateful for our deliverance and express our gratitude by commemorating their great deeds as we are wont to celebrate the memories of our national heroes to whom we are indebted for our political freedom.

THE INFANT WELFARE MOVEMENT IN THE EIGHTEENTH CENTURY

PART II*

By ERNEST CAULFIELD, M.D.

HARTFORD, CONN.

SOME EARLY EFFORTS TOWARD RELIEF

BEFORE discussing at length the important steps taken for the relief of children, it is necessary to mention briefly various attempts made toward ameliorating their condition. At the outset, we must distinguish between true infant welfare, i.e., measures taken or advocated, which if carried out would ultimately reduce infant mortality, and other forms of welfare of an educational value. As this second method was often combined with the feeding and clothing of destitute children, it must to some degree have prolonged life. But as their education and instruction were the primary motives behind these charitable endeavors, they were principally for older children and consequently do not need to be discussed in this article. They do however deserve brief mention.

The first in time and importance was Christ's Hospital, described in 1598 as follows: "Christs hospital, in Newgate market of a new foundation in the Grey Fryers church by King Henry VIII: poor fatherless children be there brought up and nourished at the charges of the citizens."[16] But in the reign of King Edward VI, the chief object was to provide "honest education and instruction" for children.

In 1686 there was an effort made by the Justices of Middlesex to take care of the infant poor. The following is taken from their proposals:

> For want whereof many great evils and inconveniences are daily found, by the wilful and careless causing or suffering many infants to perish, or to suck in wicked and debauched principles, to the ruin, as it is to be feared, often of their souls as well as bodies.
>
> Now, for the remedy thereof, a general Nursery or Infantory, is recommended by his Majesty's justices of the peace at the quarter sessions for Middlesex and Westminster, to the inhabitants therein, as by their orders at their several sessions may appear.
>
> And for that purpose, the justices of the peace of the county of Middlesex, have already disposed of, and appropriated a great public building at Clerkenwell, (whose good examples, it is hoped, will soon be followed by others) and such orders and provisions are there already made, that infants shall be there received and provided for with all manner of necessaries, and be taught to read and be bred up in true religion and virtue . . . [17]

The institution failed shortly after its establishment, but might be considered as a noble effort. It was chiefly concerned with education, moral and practical, rather than with health. However there was mentioned in the regulations that "a Physician, an Apothecary and Chirurgeon, who attend weekly, every Thursday, in their several ways, to take care of, and provide for the children."

Mrs. Elisabeth Cellier, in 1687, presented a manuscript to King James, stating:

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* Part I appeared in the September, 1930, issue of the ANNALS OF MEDICAL HISTORY, p. 480.

> That, within the space of twenty years last past, above six thousand women have died in child-bed, more than thirteen thousand children have been born abortive, and above five thousand chrysome infants have been buried, within the weekly bills of mortality: above two thirds of which, amounting to sixteen thousand souls, have in all probability perished, for want of due skill and care, in those women who practice the art of midwifery.
>
> Besides the great number which are overlaid, and wilfully murdered, by their wicked and cruel mothers, for want of fit ways to conceal their shame, and provide for their children, as also the many executions on the offenders.[18]

To remedy the situation she proposed the establishment of a corporation of midwives so that they could be licensed, supervised and instructed, and also as a necessary part of her scheme, "a good, large, and convenient house, or hospital, may be erected, for the receiving and taking in of exposed children . . . " Mrs. Cellier's detailed proposal contained the germ of an excellent hospital school, but there is no evidence that it ever bore fruit.

The President and Governors of the Poor for the city of London, incorporated by an act of Parliament in 1662, sometime later

> . . . found themselves not only in a Condition to fit up and finish a spacious Building in *Bishops-gate-street without*, for the Entertainment of the greatest Objects of Commiseration, but likewise to receive into the same a great Number of the said miserable and unhappy Vagrant Orphans, known by the infamous Name of the *Black Guard;* and whose Parents being dead, were reduc'd to the greatest Extremities; and being destitute of Relations, Friends, and all the Necessaries of Life, were become the Pest and Shame of the City, by pilfering and begging about the Streets by Day, and lying therein almost naked in all Seasons of the Year by Night.
>
> Of this Sort of wretched and piteous Objects, there were in this House in the Year 1704, Three hundred and Sixty-eight, who were fed, cloath'd and taught both in the Principles of Religion, and to work toward their Support, whereby, instead of being a common Nuisance to, they were render'd of Service to the Publick; and who otherwise would have been brought up in the greatest Wickedness, the Consequence whereof, is generally an ignominious Death . . .
>
> Be that as it will, I am certain no Charity can be better bestow'd, than on the helpless and miserable Objects before us, who seem to have a Claim to it previous to all others, by reason of their Age and most deplorable Circumstances. But the Citizens withdrawing their Contributions, this great and truly good work, is very much decreas'd, as will appear by comparing the above with the following Account. And for want of a proper Fund for it's Support, 'tis like to be intirely lost, to the great Dishonour of the City, whose Streets were never more pester'd with such deplorable Objects than at present; many of whom, to the great Scandal and Reproach of the Citizens, having neither Friends, or Abode, go almost naked, and in the utmost Extremity by Night, seek Shelter under Bulks and Penthouses in the Rigor of Winter; whilst many of their fellow Creatures, who enjoy all the good Things of this Life, seem to regard them without the least Commiseration: While their domestick Brutes (Lap-Dogs, Cats, &c.) are dandled and pamper'd after the most delicate Manner, and soft Cushions, or other downy Beds carefully laid, to repose their irrational Darlings on.[19]

The Corporation for the relief of the poor Widows and Children of Clergymen, founded in the time of Charles II; the numerous charity schools beginning in 1697, (by 1734 there were about 130 of them in London); the Grey-Coat Hospital in Tothill Fields incorporated in the fifth year of the reign of Queen Anne "to maintain, cloath, and teach" poor children; are institutions that although very worthy, are not related to the subject at hand.

During the reign of Queen Anne there was an attempt on the part of several merchants of London to open an institution "for the reception of such infants, as the misfortunes, or inhumanity of their parents, should leave destitute of support." Before the plan could reach maturity, they were influenced by the popular prejudice that such an institution would be an encouragement of vice in that it would be an easy means for unscrupulous and debauched women to provide for their illegitimate children. The plan was therefore abandoned.[20]

With the collapse of the South Sea Bubble, a scheme to make money by subscriptions for a foundling hospital, was unearthed and thwarted.

On account of its antiquity, mention should be made of the Countess of Lincoln's Nursery. This is not an account of an institution, but a brief for maternal nursing. Elisabeth Lincoln had lost two of her eighteen children, the deaths being due, she suspected, to the negligence of the wet nurses. She mentions many cogent reasons for not trusting these mercenary women, and also many biblical references to prove that it was God's will that women should nurse their own children. By way of proof, it was pointed out that Eve had nursed Cain, Abel and Seth. It would have spoiled the whole story to have had a wet-nurse in the environs of Eden.[21]

In the literature of this period, one finds sentiments expressed which show that there were many conscious of the miserable state of childhood.

Richard Steele in *The Spectator* (Dec. 12, 1711) denounced the fashionable neglect of maternal duty. "I beg of you, for the Sake of the many poor Infants, that may and will be saved, by weighing this Case seriously, to exhort the People with the utmost Vehemence to let the children suck their own mothers, both for the Benefit of Mother and Child." He used the time worn argument of the child deriving its mental and physical characteristics from the woman who nursed it.

In *The Guardian* (No. 105) Addison writes the following which is of some interest:

> Since I am upon this subject, I shall mention a Piece of Charity which has not been yet exerted among us, and which deserves our attention the more, because it is practised by most of the Nations about us. I mean a Provision for Foundlings, or for those Children who through want of such a Provision are exposed to the Barbarity of cruel and unnatural Parents. One does not know how to speak on such a subject without Horror: But what Multitudes of Infants have been made away by those who brought them into the World, and were afterwards either ashamed or unable to provide for them.

Tillotson,* Archbishop of Canterbury, preached a sermon, which was later published, on the "Education of Children." The greater part of this sermon was devoted to the maternal nursing of infants. Tillotson, realizing the increasing fashion among ladies of "higher Rank and Quality" of assigning this important duty to mercenary wet nurses, thought it his privilege to admonish them. The sermon was of interest to scholars of succeeding generations; but as for the noble ladies, it fell on deaf ears.[22]

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* It was Tillotson who recommended Walter Harris as a physician to King William and it is not surprising that he should obtain material for his sermon from Harris. But we should hardly expect to find that such a brilliant preacher, noted for his originality, would slavishly copy Harris' observations, word for word, and paragraph after paragraph. There is of course the possibility that Harris borrowed from Tillotson, which is unlikely considering the subject. Or the fault may be with the compiler of the sermons.

In this connection one recalls a classic of English literature. It was the miserable condition of the poor children of Ireland that gave opportunity to one of the world's greatest satirists to rise to the heights of acrid irony. Jonathan Swift, in his "Modest Proposal," treated with cynical scorn the unhappy state of childhood as he found it in his adopted land.[23]

Thus we see that up to 1741, the next date of importance, there had been established for the relief of infants no means or measures of any account. There had been many institutions for older children, especially for their maintenance, clothing, and education. Tillotson and Steele preached to the higher classes. But when have sermons influenced fashion? The scheme proposed by the merchants of London in 1708 aborted. Addison's proposal came to naught. So that it could be publicly asserted in the House of Lords in 1736, during a discussion of the Mortmain Bill: "Let us take a View of the several Parts of this great City, or of any Part of the Kingdom, and we may see that the Hospitals we have for poor Children, are far from being sufficient for all the poor Children who have no Parents, or whose Parents are unable to provide for them."[24]

THOMAS CORAM AND THE FOUNDLING HOSPITAL

In a brief history of pediatrics, the Foundling Hospital of London does not appear to be of great importance. Foundling hospitals were an old story on the continent and the idea of one in England was not original. From the standpoint of infant welfare however, this institution is of great significance and the date of its opening in 1741 marks the beginning of an important epoch, and forms the turning point of my story. The conditions in the first three decades of the eighteenth century were in reality very similar to the conditions existing in the seventeenth century and were characterized by an extreme callousness toward the life of a child. The feeble attempts at infant welfare, previously pointed out, were all abortive. The establishment of the Foundling Hospital and the circumstances connected with it, mark an awakening, and in England, was the first successful attempt to deal with the infant poor on a large scale. For that reason an account of this institution is in order; for although its history has been written up many times, its importance in awakening a consciousness toward the value of an infant's life has not been sufficiently emphasized.

Thomas Coram (1668–1751) was born at Lyme Regis, in Dorsetshire. Like his father, he showed a fondness for the sea and most of his life was spent in maritime trade, especially with America. He had a diversity of interests concerning the colonies and proposed many practical schemes for their development, realizing that they would thereby be of greater benefit to England. It is interesting to us to find him engaged as a shipwright in Taunton, Mass. where he later conveyed to the proper authorities 59 acres of land for the building of a church or schoolhouse. He gave a valuable library to the parish at Taunton.

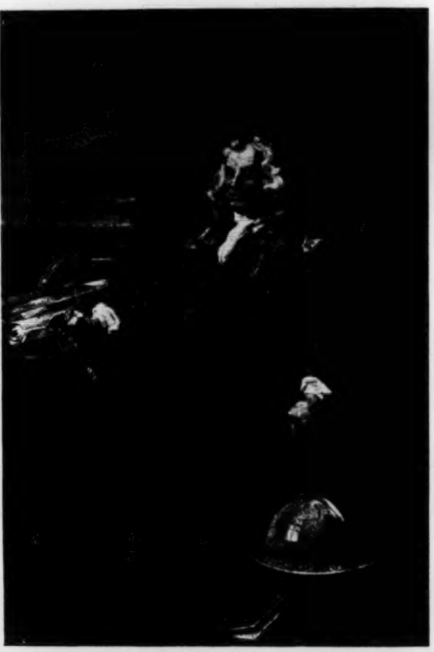


FIG. 4. "THE PORTRAIT WHICH I PAINTED WITH MOST PLEASURE, AND IN WHICH I PARTICULARLY WISHED TO EXCEL, WAS THAT OF CAPTAIN CORAM FOR THE FOUNDLING HOSPITAL, . . . "—HOGARTH.

Later he removed to Boston and became a shipmaster engaging in commerce between the colonies and England. In 1719 he retired from the sea service and devoted the remainder of his life to useful humanitarian projects. Horace Walpole said of him that he was "the honestest, the most disinterested and knowing person about the plantations I ever talked with." Many important phases of the early development of the colonies occupied Coram's attention. He acted as a trustee in a project for carrying over and establishing unfortunate familes in America, which developed into, and is better known to us as Oglethorpe's Colony in Georgia. He also proposed a plan for settling Nova Scotia, presenting to the King a petition signed by a number of poor artisans unable to support themselves and their families which stated: "that to avoid extreme want, and escape the temptations which always attend poverty, they were desirous of being settled securely in some of the plantations of America." Cod-fishing and the development of naval stores that would free England from her dependence upon her continental neighbors were in Coram's mind. This, in itself, is enough to make Coram's name survive even if we do not mention his plans for the development of the salt ponds of the Bahamas, or for religious education of the Indians.

After his retirement from active sea-going work and while residing at Rotherhithe, he often used to walk to London. These walks "afforded him frequent occasions of seeing young children exposed, sometimes alive, sometimes dead, and sometimes dying, which affected him extremely."

The bodies of dead or murdered infants thrown on dunghills for want of proper burial well might move any man in the nineteen-thirties, but the surprising fact is that in the seventeen-thirties it was Coram alone who was moved to the extent of taking a practical interest. A man of his proficiency knew there must be some remedy and knew also that to his many friends some attempts at relief would be gratifying. Various plans occurred to him, but that of erecting huts in Lamb's Conduit Fields for the reception and nourishment of deserted infants seemed most satisfactory. He discussed these subjects with his friends and meeting an encouragement which spurred him on, he undertook the task. But he had to combat that greatest of all difficulties, popular prejudice. Centuries of indifference toward the state of infancy was not easy to overcome. From some he met rebukes, from others apathy; still others he convinced by argument, but his noble example moved more. For seventeen years he labored and exhausted all the money at his disposal before his efforts were finally crowned with success. Like St. Vincent de Paul before him, Coram appealed to the noble ladies. Coram's success depended upon his zeal but also upon his tactful manner. He did not preach to these ladies about nursing their babies, as Tillotson and Steele had done. Coram knew the feminine mind. He appealed to their reason and sympathy. He had them sign a petition, which so well expresses the conditions of the times, that it will bear repetition.

> Whereas among the excellent designs and institutions of charity, which this nation, and especially the city of London, has hitherto encouraged and established, no expedient has yet been found out for preventing the frequent murders of poor miserable infants at their birth; or for suppressing the inhuman custom of exposing new-born infants to perish in the streets, or the putting out such unhappy foundlings to wicked and barbarous nurses, who, undertaking to bring them up for a small and trifling sum of money, do often suffer them to starve for want of due sustenance or care; or if permitted to live, either turn them into the streets to beg or steal, or hire them out to loose persons, by whom they are trained up in that infamous way of living, and sometimes are blinded, or maimed and distorted in their limbs, in order to move pity and compassion, and thereby become fitter instrument of gain, to those vile merciless wretches.
>
> For a beginning to redress so deplorable a grievance, and to prevent as well the effusion of so much innocent blood, as the fatal consequences of that idleness, beggary, or stealing, in which such poor foundlings are generally bred up, and to enable them, by an early and effectual care of their education, to become useful members of the commonwealth; we, whose names are underwritten being deeply touched with compassion, for the sufferings and lamentable condition of such poor abandoned, helpless infants, as well as the enormous abuses and mischiefs to which they are exposed; and in order to supply the government plentifully with useful hands on many occasions; and for the better producing of good and faithful servants, from amongst the poor and miserable cast-off children or foundlings . . . are desirous to encourage, and willing to contribute toward erecting an hospital for infants . . . which we conceive will not only prevent many horrid murders, cruelties, and other mischiefs, and be greatly beneficial to the public; but will also be acceptable to God Almighty, as being the only remedy of such great evils, which have been so long neglected, though always complained of . . .

This petition was signed by twenty-two ladies, members of London's best known families.

In 1738, an application for a charter for a hospital for foundlings was presented to the Attorney General. It was soon granted and on Nov. 20, 1739, the corporation met at Somerset House and the Duke of Bedford was chosen as the first governor. Coram addressed the meeting and related that:

> Long and melancholy experience of this nation has too demonstrably shewn, with what barbarity tender infants have been

> exposed and destroyed, . . . My Lord, although my declining years will not permit me to hope seeing the full accomplishment of my wishes, yet I can now rest satisfied, and it is what I esteem an ample reward of more than seventeen years expensive labour and steady application, that I see your Grace at the head of this charitable trust, assisted by so many noble and honorable Governors.

Coram lived to see the hospital well established and in his later years he paid frequent visits to the institution and derived great satisfaction in seeing many happy children who would, except for him, have died in misery. A few years before his death, on being questioned concerning a benefaction that was being raised for him, he said, "I have not wasted the little wealth of which I was formerly possessed in self-indulgence and vain expenses, and am not ashamed to confess that, in this my old age, I am poor."

He died at his lodgings near Leicester-Square on March 29, 1751 and his body was interred in the Chapel of the Hospital, with impressive and colorful ceremony.

The opening of the Foundling Hospital took London by storm. Relatively speaking, no charitable institution ever received such wholehearted response from the populace. The array of London's titled nobility and gentry was more becoming to a coronation than to an institution devoted to the welfare of infants. And the interest of the middle classes was no less zealous. The minutes and proceedings of the meetings of the Corporation were eagerly sought for in the public press. A committee of fifty were selected from the "four hundred" among whom we recognize Sir Hans Sloane, Bart., and Dr. Richard Mead, who after the reading of the charter, "in a most pathetic manner, set forth the great necessity of such an Hospital, and the great advantages that must accrue to the nation." They selected as their common seal: "Pharaoh's Daughter and her Maids finding Moses in the Bullrushes."

The fashion to contribute to the support of the hospital continued unabated and the popular prejudice against Coram's early efforts diminished to the vanishing point. When one reads in the contemporary press, notices that a Mr. Thomas Emerson left 11,000£ and a Mr. Cholmly left "all his fortune" one realizes that their zeal was more than idealistic. The story and progress of the institution are easily reconstructed from the frequent paragraphs concerning it that appeared in the press.

Subscriptions poured in and an effort to convert Montague House (which later became the British Museum) being considered inexpedient, the governors purchased from the Earl of Salisbury 56 acres on the north of Ormond Street on which to build. This turned out to be a profitable purchase, for with the expansion of the city, the increased value of their excess land became a constant source of revenue.

Some houses in Hatton-Garden were hired as temporary quarters and on March 25, 1741, we read: "The Guardians of the Hospital first received into their House 19 Males and 11 Females being all it could contain. Those above two months old, and those who had infectious Distempers, were rejected."

An attempt at "dry-feeding" as it was called soon proved to be accompanied by a mortality that was defeating their purpose and in 1747 appeared a detailed description of the manner in which the children were cared for, as to clothing, habits, diet and exercise.

FIG. 5. THE FOUNDLING HOSPITAL FROM AN OLD PRINT. THE BUILDINGS HAVE BEEN RECENTLY DEMOLISHED.

The child when first admitted was baptised (the names given these children are quite amusing but not important), was properly recorded and as soon as conditions warranted, was sent out to the country to be wet-nursed, under the supervision of voluntary and paid social-workers. The child was kept in the country until four years of age, when he was returned to the instituton. After this he received instruction in religion, reading, writing and in practical subjects that would fit him for an apprenticeship. The daily routine was very exacting and from our present day standards was a bit severe. After the child was placed out as an apprentice he still remained under the care of the guardians until he reached a certain age. A number of cases in which these foundlings had been cruelly treated were prosecuted in the courts with the governors of the hospital as plaintiffs.

The following is of interest: "Seventeen children have been lately inoculated for the small-pox at the Foundling Hospital, and all recovered; as did 53 inoculated at different times before." Similar notices are frequent.

About the year 1749 we have the beginning of a long series of notices that have a tremendous significance and which begin to spell disaster. In February, 20 children were taken in, out of 76 offered; in June, 20 admitted out of 83 offered, and so on. In April 1751, "of fifty-five children presented, twenty were admitted by lot." The hospital is being overtaxed, and the mothers, each one more anxious than the other to be relieved of the care and burden of her child, often resorted to disgraceful fighting at the door. In order to prevent any scandal about favorites, the admission was then determined by lot, "black balls" for the less fortunate. But applications continue to increase. "Eighty-two offered—twenty admitted"; "ninety-five offered on Feb. 8, 1752"; until we find in 1753 that 116 were offered for admission on one day! What would one of our modern, well-equipped foundling hospitals do, if deluged with 116 mothers offering up their babies!

Money continued to pour in however and "The capital of this charity is now said to exceed £100,000 besides annual subscriptions; and it is hoped that after the building is completed it will soon be in a condition to receive all children that are offered." But money had also been spent for land, buildings and wages to the nurses and servants, and even with a large building the resources were insufficient for the care of all the children that were offered. But something had to be done and on March 10, 1756, the governors appealed to Parliament for the "extension and support of the charity." The affairs of the hospital had received considerable publicity and Parliament was not slow in granting liberal sums. On April 6th the following resolution was passed:

> That enabling the said hospital to receive all children that shall be offered, is the only method to make that charitable institution of general utility; that in order to this, assistance of parliament is necessary, and that to render the good effect universal, it should be enabled to appoint proper places in all counties, ridings, or divisions, for the reception of all exposed and deserted children.

In other words, if public funds are to be used, then indiscriminate charity to all: a fallacy little appreciated by our modern zealots of state medicine.

There is no monetary standard to measure the extent of the abuses that followed as a consequence of this act; the measurement can only be in terms of infant lives. Astounding episodes that pale the imagination!

Children were brought in, not only in a poor condition but actually dying, in order to save the parents the expenses of burial. And many died at the hospital door before the details connected with admission could be carried out. The overseers of the parish workhouses immediately began to transfer all their infant poor to the hospital. In connivance with the father, they snatched infants from the mother's arms while she was still "in the straw" and too weak from her confinement to offer resistance, and hurried it off to the asylum. The cost of a few months' maintenance mattered more than the infant's life.

It was no longer the Foundling Hospital of London but the Foundling Hospital of England. Children were sent from far off towns, sometimes from a distance of over three hundred miles so that the parents could enjoy the generous privileges that Parliament gave them. This conveyance of children became so common that there grew up a trade indulged in by notorious characters who undertook to transport unwanted children at so much a head.

> At Monmouth, a person was tried for the murder of his child, which was found drowned with a stone about its neck! when the prisoner proved that he delivered it to a travelling tinker, who received a guinea from him to carry it to the Hospital. Nay, it was publicly asserted in the House of Commons, that one man who had the charge of five infants in baskets, happened in his journey to get intoxicated, and lay all night asleep on a common; and in the morning he found three of the five children he had in charge actually dead! Also, that of eight infants brought out of the country at one time in a waggon, seven died before it reached London: the surviving child owing its life to the solicitude of its mother; who rather than commit it alone to the carrier, followed the waggon

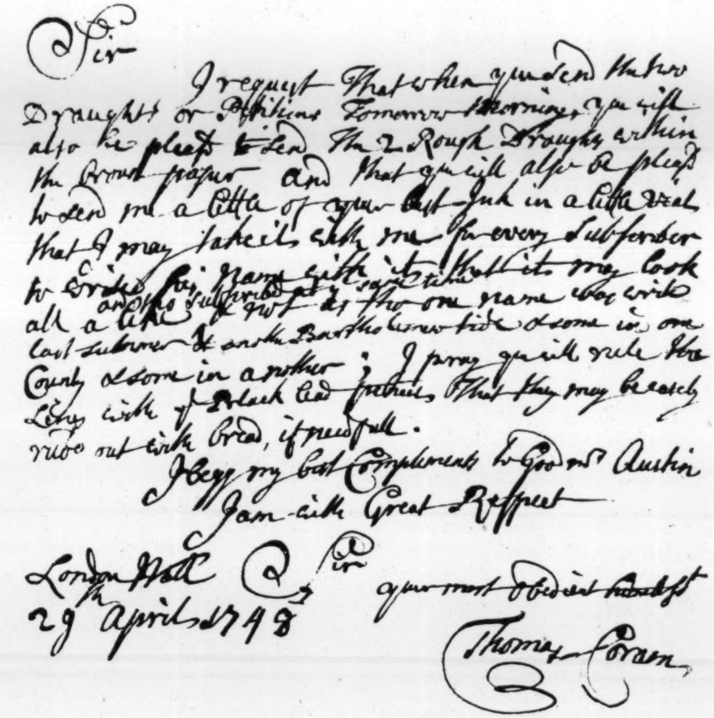
> on foot, occasionally affording her infant the nourishment it required.
>
> It was further stated, that a man on horseback, going to London with luggage in two panniers, was overtaken at Highgate, and being asked what he had in his panniers, answered, "I have two children in each: I brought them from Yorkshire for the Foundling Hospital, and used to have eight guineas a trip; but lately another man has set up against me, which has lowered my price."
>
> This practice of transporting children from remote towns was condemned by a distinct resolution of the House of Commons, and a Bill was ordered to be brought in to prevent it; but this Bill was never presented, so that parish officers and others still continued to carry on their illicit trade, by delivering children to vagrants, who, for a small sum of money, undertook the task of conveying them to the Hospital, although they were in no condition to take care of them, whereby numbers perished for want, or were otherwise destroyed; and even in cases where children were really left at the Hospital, the barbarous wretches who had the conveying of them, not content with the gratuity they received, stript the poor infants of their clothing into the bargain, leaving them naked in the basket at the Hospital gate.[25]

With parliamentary help, conditions grew worse instead of better. The age limit was extended to six months and the hospital soon was inundated. It was veritably "a regiment of infantry" that descended upon it. Fifteen thousand infants were admitted in less than four years! Public discussions and pamphlets, pro and con, were numerous. The question so summarily dismissed in 1741, "whether the children being admitted into the new Hospital after so private a manner, without the least Enquiry from whom or whence they are brought, will not be an Encouragement to a Vice, which is already very predominant in this age" had a prophetic significance. The public notices concerning the institution begin to have a different flavor:

> . . . to encourage parents to desert their children must be allowed to be the greatest of evils . . .
>
> The prohibition of the general reception of children into the Foundling Hospital, is certainly a measure highly commendable . . .
>
> Of all the mischiefs that have been engendered by over-anxiety about the poor, none have proved more fatal than a foundling hospital. They tend to cool affection for children, still more effectually than the English parish-charity. At every occasional pinch for food, away goes a child to the hospital; and parental affection among the lower sort turns so languid, that many who are in no pinch, relieve themselves of trouble by the same means . . .
>
> Down then with foundling-hospitals, more noxious than pestilence or famine. An infant exposed at the door of a dwelling-house, must be taken up, but in that case, which seldom happens, the infant has a better chance for life with a hired nurse than in a hospital; and a chance perhaps little worse, bad as it is, than with an unnatural mother.[26]

Of the 15,000 infants received, over 10,000 paid with their lives for this little "noble experiment" in paternalistic government. Such a state of affairs could not go on and Parliament declared "That the indiscriminate admission of all children under a certain age in the Hospital, had been attended with many evil consequences, and that it be discontinued." Parliament withdrew its support and the governors, sensing disaster, made new rules for the selection of cases and the hospital settled down to an era of usefulness and value.

One closes Brownlow's account of the hospital with the impression that the aim of the founder was directed toward correcting vice in women and that the taking of an illegitimate child from an unfortunate woman, thereby enabling her to forget her shame and seek reestablishment in society, was the chief purpose of the institution. Regardless of the resolutions which seemed most expedient to the governors in 1760, after the disgraceful period under Parliamentary regime, there can be no doubt that the hospital was intended for "exposed and deserted" infants without regard for the virtues of the mother. At admission "no questions were asked." The institution profited by its errors; but lack of discrimination in the distribution of charity was the principle that nearly wrecked it.



Sir
I request That when you send the two
Draughts or Petitions Tomorrow Morning you will
also be pleasd to send the 2 Rough Draughts within
the Brown paper And that you will also be pleasd
to send me a little of your best Ink in a little Vial
that I may take it with me for every Subscriber
to write his Name with it that it may look
all a like and who subscribed at y same time & not as tho one name was write
last summer & another Bartholomew tide & some in one
County & some in another; I pray you will rule the
Lines with y Black lead pencils That they may be easily
rubd out with Bread, if needfull.
I begg my best Complements to Good Mrs Austin
I am with Great Respect
Sir
London Wall
29th April 1748
your most obedient humble Servt
Thomas Coram

FIG. 6. CORAM'S AUTOGRAPH FROM "MEMORANDA; OR, CHRONICLES OF THE FOUNDLING HOSPITAL." BY JOHN BROWNLOW, LONDON, 1847.

But governmental interference could not minimize the influence of the Foundling Hospital upon the general state of infancy. The foundation of this institution demonstrated and brought into the public mind intolerable abuses. The decade 1740–1750 was a notable one in pediatrics. It was a decade in which the public conscience was awakened and the effects of it continued throughout the century. The response of the nobility and gentry was general and gratifying, and the response of the middle classes was no less noble.

The famous Hogarth, who first appreciated that ordinary happenings of everyday life were worthy of reproduction, took a very active interest in the hospital and was untiring in his efforts. The accompanying engraving of Coram is taken from the original which he presented to the hospital. "The portrait which I painted with most pleasure, and in which I particularly wished to excel, . . . "

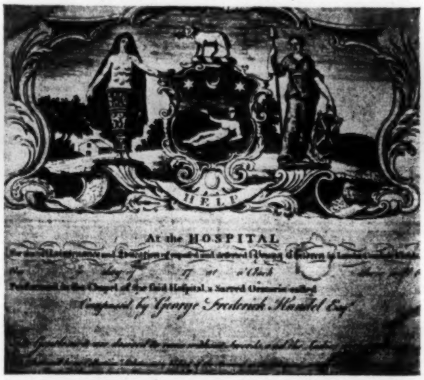
Benjamin West, Reynolds, Wilson, and many others contributed by their efforts and the annual meetings (Nov. 5), in which they exhibited their pictures for the hospital's benefit, had an important bearing on the later formation of the Royal Academy.

When George Frederick Handel Esq. gave one of his annual recitals of the Oratorio of the Messiah after that composition became popular, we read "there were above 500 coaches, besides chairs, etc. and the tickets amounted to above 700 guineas." The Prince and Princess of Wales graced one of these recitals with their presence (May 27, 1749) and the audience numbered over 1000 persons. His Majesty's bounty sometimes amounted to 2000£.

Lawrence Sterne, Bishop Madox, and others preached charity sermons to large and generous audiences.

Evidences of popular approval are endless. It was a great awakening!

But the effects were even more far-reaching. This popular interest in children was manifested in pediatric contributions. It is safe to say that with the appearance of "A Full View of all the Diseases incident to Children" (1742); John Martyn's translation of Walter Harris (1742); the translation of Andry's "Orthopedia or the Art of Correcting Deformities in Children" (1743); the translation of Astruc's work on Children (1746); and Wm. Cadogan's "Essay on Nursing" (1748), English pediatric literature was enriched to an extent that was not equalled by any other decade before the nineteenth century. And more important, these works all appeared in English and with one notable exception, (Heberden's "Epitome") marked the end of works in Latin.



HELP

At the HOSPITAL

Composed by George Frederick Handel Esq

FIG. 7. AN INVITATION TO ONE OF HANDEL'S CONCERTS AT THE HOSPITAL. REPRODUCED THROUGH THE KINDNESS OF DR. JOHN RUHRÄH. THE UPPER PART SHOWS THE ARMS OF THE HOSPITAL PRESENTED TO THE COURT OF GOVERNORS, BY THE AUTHORITIES OF THE HERALD'S COLLEGE IN 1747 AND IS SAID TO HAVE BEEN DESIGNED BY HOGARTH.

It is not surprising to find that this interest in foundlings, which was being so universally discussed should have a bearing on the literature of the period. One insignificant, but rather popular work, "The Foundling Hospital for Wit, intended for the Reception and Preservation of such Brats of Wit and Humor, whose Parents chuse to drop them, London 1743" was a crude attempt to take advantage of a popular subject. The preface was a paraphrased copy of the Royal Charter.

A point not fully appreciated by scholars of English literature is the connection between this awakened interest in foundlings and the appearance of our first great English novel. It was said that Henry Fielding, as a writer for daily subsistence caught at whatever interested the public for the time. It is well known that this author, who in the capacity of a justice had learned first-hand the misery and sufferings of the poor and who was no less notable as one of their benefactors, had produced "Joseph Andrews" in his attempt to caricature the style, principles and personages of Richardson's "Pamela." Here Fielding was taking advantage of a work of fiction that had caught the public whim; but the imitation is acknowledged to be superior to the original. In the first work of fiction founded upon the plan of painting from nature, Henry Fielding, with an ability to satirize almost equal to that of Swift, held up for ridicule one of the accepted customs of the times. At the risk of being tiresome, the following paragraph from "Tom Jones, The History of a Foundling" is quoted at length.

It will be recalled that Mr. Allworthy had just returned from London to behold an infant, "wrapt up in some coarse linen, in a sweet and profound sleep, between his sheets."

> When Mrs. Deborah returned into the room and was acquainted by her master with the finding the little infant, her consternation was rather greater than his had been; nor could she refrain from crying out, with great horror of accent as well as look, "My Good Sir! what's to be done?" Mr. Allworthy answered, she must take care of the child that evening and in the morning he would give orders to provide it a nurse. "Yes, sir," says she, "and I hope your worship will send out your warrant to take up the hussy its mother, (for she must be one of the neighbourhood,) and I should be glad to see her committed to Bridewell, and whipt at the cart's tail. Indeed, such wicked sluts cannot be too severely punished. I'll warrant 'tis not her first, by her impudence in laying it to your worship." "In laying it to me! Deborah," answered Allworthy; "I can't think she had any such design. I suppose she hath only taken this method to provide for her child; and truly I am glad she hath not done worse." "I don't know what is worse," cries Deborah, "than for such wicked strumpets to lay their sins at honest men's doors; and though your worship knows your own innocence, yet the world is censorious and it hath been many an honest man's hap to pass for the father of children he never begot; and, if your worship should provide for the child, it may make the people apter to believe; besides, why should your worship provide for what the parish is obliged to maintain? For my own part, if it was an honest man's child, indeed; but for my own part, it goes against me to touch these misbegotten wretches, whom I don't look upon as my fellow-creatures. Faugh, how it stinks! It does not smell like a christian. If I might be so bold as to give my advice, I would have it put in a basket, and sent out and laid at the church-warden's door. It is a good night, only a little rainy and windy; and, if it was well wrapt up, and put in a warm basket, it is two to one but it lives till it is found in the morning. But if it should not, we have discharged our duty in taking care of it; and it is, perhaps, better for such creatures to die in a state of innocence, than to grow up and imitate their mothers; for nothing better can be expected of them.

WILLIAM CADOGAN AND HIS ESSAY ON NURSING

Attention has been called to the influence of the Foundling Hospital on pediatric literature. One publication in particular deserves more than passing mention, namely "An Essay upon Nursing and the Management of Children" by W. Cadogan, M.D. (1711–1797). After the hospital was opened and its portals besieged by large numbers, the governors, most of whom were laymen, were quite at sea as to the proper care and management of the children. They addressed a letter to the College of Physicians asking for instructions. A similar request must have prompted Cadogan to write his deservedly famous essay. "Since you desire my sentiments upon the subject" he writes, and then proceeds to lay down rules on nursing, feeding, clothing and exercise. This was first published without his name, and begins with words to the effect that it was about time that men of sense took an interest in this largely neglected field of infant welfare.

Cadogan vigorously opposed the false notions of the nurses, aunts and grandmothers who were "taught by the Physicians of their unenlightened days" and in their place warmly advocated principles that have since stood the test of time, that were eagerly grasped by his contemporaries and successors in pediatrics. But the essay appears the more remarkable when one considers that it was written at a time when that which we now accept as common knowledge was seldom applied to infants even of the better class. For we must remember that it was not an easy task to convince a class of people who considered that one of the most important things in infant care was the exact and proper application of a stay for the neck. For if the child turned its head just a little too far, the neck was certain to be broken.

In the days when a baby's head was massaged and bandaged to improve its shape and to aid the fontanelle in closing, and when its body and limbs were cramped in flannels, swathes and wrappers, Cadogan bravely advocated loose clothing. This was quite at variance with the practice of the omniscient nurses who thought that tight bandages would prevent bowlegs and gibbous spines. Swaddling infants had been the custom for ages and even persists to this day among certain European races, as anyone familiar with dispensary practice can testify. Our own infants have Cadogan to thank for the right and liberty to kick their legs. The whole manner of clothing underwent such a radical change, that with very little alteration it is still the accepted method.

The present rising generation is indebted to Wm. Cadogan for its daily change in clothing.

> There is an odd notion enough entertained about change, and the keeping of children clean. Some imagine, that clean linnen and fresh cloaths draw and rob them of their nourishing juices. I cannot see that they do anything more than imbibe a little of that moisture which their bodies exhale. Were it, as is supposed, it would be of service to them; since they are always too abundantly supplied, and therefore I think they cannot be changed too often, and would have them clean everyday; as it would free them from stinks and sournesses, which are not only offensive, but very prejudicial to the tender state of Infancy.*

No attempt will be made to summarize this little brochure. It is in itself so concise that it would suffer by any summary. Simple, plain observations from nature without any obscure or high sounding phrases. No lengthy quotations from the ancients as if for proof. This essay, so clear, so forceful, so direct went through ten editions and was quoted freely in succeeding works on children. It was incorporated unchanged into some nineteenth century medical books; and was translated into French and German. It is a safe assertion that no other like contribution of its size had such tremendous influence.[27]

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* It cannot be maintained that Cadogan was the first to advocate daily baths and change of clothing. Also in the matter of loose clothing, he was anticipated somewhat by Henry Bracken ("The Midwifes Companion") and by the versatile Stephen Hales ("A Description of Ventilators." Lond., 1743, p. 76). Wm. Buchan claimed credit by his publication ("De Infantum vita conservanda"). But by the forcefuless of his style and the influence of his doctrines on his associates and the common people, the credit properly belongs to Cadogan.

The Foundling Hospital sent printed instructions to all the foster mothers for the treatment of minor illnesses. It is very likely, as has been observed, that Cadogan's essay was likewise distributed.

With very little alteration, Cadogan's pamphlet could be recommended to present-day mothers. His observations on bottle feeding, or "dry nursing" as it was called, display the fault of the times, not of the man. Cadogan opposed it very rightly, for "not one in three survived it." This particular observation was commonly expressed in contemporary literature and originated with Sir Hans Sloane from his experiences previous to, and during the early days of the Foundling Hospital.

According to Munk, William Cadogan was born in London, but from the records of his matriculation at Oriel College (Dec. 5, 1727) he was the son of Roger Cadogan of Usk in Monmouth county.[28] On June 18, 1731, at the age of twenty he received his bachelor's degree in arts. To one inclined to study medicine at that time, it was considered a mark of distinction to attend the lectures of the eminent Boerhaave and so this worthy pupil proceeded to the continent and in 1737 received the degree M.D. from Leyden with the thesis "De Nutritione, Incremento et Decremento Corporis." Here he learned the art of careful observation which was to be a valuable asset in later years. He soon returned to his native country and became a physician in the army and it was probably at this time that he saw service with the army in Portugal.[29]

He returned to practice medicine at Bristol and became a Fellow of the Royal Society. When in 1748 the "Essay upon Nursing" first appeared, in order to lend emphasis to his observations he mentioned that he was a father, from which we must conclude that he was married before he came up to London.

His "Essay" became unusually popular and five editions were exhausted within three years. Cadogan's reputation was immediately established. As a result of the excellence of his observations he was elected a physician to the Foundling Hospital (1754). In order to satisfy the requirements for admission to the College of Physicians, he reentered Oxford and on June 20, 1755 received the degree of M.A. and on June 27 of the same year, the degrees B. MED. and D. MED. It is not certain that he was a member of the Dilettante Society but it is quite probable that he was, for his name is found in that distinguished group that dined at the Foundling Hospital on November 5, 1757.[30]

After his admission to the Royal College in 1758, he occupied many offices and had the unusual distinction of delivering two Harveian Orations, the one in 1764 said to have been a panegyric on English medical worthies.

The eighth edition of his "Essay" is by the "Late Physician to the Hospital." The exact reason for his resigning is not known. We can hardly be so uncharitable as to suppose that his increasing popularity made it difficult for him to devote his time to the infant poor, although he complains of lack of time in his writings. Maybe it was the death of his first wife or perhaps his contemplated removal to Fulham. But more likely, his reason for giving up his affairs at the hospital can be attributed to ill health for he writes in 1771:

> . . . My answer is, that if I may trust the experience of my whole life, and above all the experience I have had in my own person, having not only got rid of the gout, of which I have had four severe fits in my younger days, but also emerged from the lowest ebb of life, that a man could possibly be reduced to by colic, jaundice, and a complication of complaints, and recovered to perfect health; which I have now uninterruptedly enjoyed above ten years . . .[31]

Sometime about 1759 he obtained from the Bishop of London a lease of three acres of land at Parson's Green in Fulham. In 1760 he obtained nine acres, upon which he agreed to build one or more substantial houses at his own cost. His original house built in 1760, was after his death sold to a Mr. Ellis who enlarged it. Later it became the Earl of Egremont's mansion. Known as Hurlingham House it was still later to become a fashionable resort of society.[32]

There is recorded in the Fulham Church (All Saints) register that "Wm. Cadogan of this parish Doctor of physic, widower, and Anne Spencer of the same, widow, were married in this church by licence this 6 day of Aug. in the year 1759." The record of this marriage in the *Gentleman's Magazine* gives his town residence as Red-lion Sq. This was a neighborhood of many attractions for the student of pediatric history. Here, on Aug. 1, 1732, "dy'd Dr. Harris, a Physician"; here lived Jonas Hanway, the philanthropist; James Nelson, apothecary, of Red Lion Street, Holburn, wrote a treatise on the government of children; and it was in Red Lion Square that George Armstrong first opened his dispensary.

It has been assumed that Cadogan was above writing for the popular press, but there appeared an article in the *Gentleman's Magazine* (1765, p. 547) entitled "Some of the Causes that occasion the Mortality of Children under Two Years of Age. In answer to Queries in the public papers, concerning the cause of the great mortality of infants in this metropolis under that age," which, although unsigned, was undoubtedly from Cadogan's pen. It is his familiar essay in a popular and abridged form.

In 1769 he sat for a portrait by R. E. Pine. The relation between the doctor and artist was more than casual, for we find a letter dated seven years afterwards in which Miss Cadogan pleads with David Garrick for an opportunity for her very dear friend Miss Pine to witness one of the actor's performances.

In 1771 he wrote a "Dissertation on the Gout." Perhaps no publication of medical interest excited so much popular attention. The London of Johnson, Reynolds, and Garrick; fashionable, carefree, erudite, self-contented London was suddenly thrown in a frenzy. Eight editions in one year were devoured. What was it that caused more alarm than the appearance of the plague itself could have caused? Surely not Cadogan's advice on moderate exercise and peaceful repose. No. The Quality suddenly awoke to discover a prohibitionist within their midst. And what commotion! "All that is good he stole, the nonsense is evidently his own" could have been expected from blunt Sam Johnson. Nearly a dozen publications appeared in the controversy that ensued. In some of them he was shamefully ridiculed; in others upheld. Ruhräh has reprinted the original article and some of the more amusing contemporary comments, to which the reader is referred. It struck a responsive chord in the heart of our own Benjamin Rush.[33] But the chief criticism directed against our learned doctor was that he did not practice what he preached. "After perusing his panegyric on moderation and restraint in diet, it was observed by one who knew him well, that few men more keenly enjoyed, or eat a heartier dinner, than Cadogan, and that with his medical friends, in the physicians club at the Thatched house, or St. Albans Tavern, he frequently departed from his abstemious and salutary maxims."[34] Who would not have enjoyed a hearty dinner with medical friends at the Thatched House? But even so, Boswell came to the rescue: "This was a general reflection against Dr. Cadogan, when his very popular book was first published. It was said, that whatever precepts he might give to others, he himself indulged freely in the bottle. But I have since had the pleasure of becoming acquainted with him, and, if his own testimony may be believed (and I have never heard it impeached), his course of life has been conformable to his doctrine."

As a matter of fact, Cadogan was not a prohibitionist in the modern sense of the term. Sanctimonious affectation was quite foreign to his soul. He had merely advocated moderation in eating and drinking as a preventive of the gout and carefully maintained a balanced sense of proportion. " . . . he may safely indulge once a week, or perhaps twice, with a pint of wine for the sake of good humor and good company, if they cannot be enjoyed without it; for I would not be such a churl as to forbid, or even damp, one of the greatest joys of human life."

Indirectly a consequence of his work on gout, Cadogan became acquainted with one of the outstanding personalities of the period. David Garrick read the book but jestingly put off the evil day when he would adopt the principles. But we later find a close and lasting friendship between the great actor and his personal physician, a friendship that formed the basis of one of the most charming literary correspondences of the eighteenth century, that between Garrick and "the divine Miss Cadogan," who acted as her father's amanuensis.[35] Garrick frequently invited the Cadogans to dine at the Adelphi or visit at Hampton. One such invitation gave rise to the following, written by Frances Cadogan from Hurlingham July 19, 1777:

> . . . Dr. Goth loquitur [Dr. Goth was the name given her father] "Tell Mr. Garrick he is a scrub; he never cares one farthing for me, but when he is in pain; here did I go myself to Bliss's, to get his medicines well made, and took a great deal of pains and sent them to him; he has never touched a drop of them; but the moment he gets a little ease, away he goes to Rigby's and plays the devil." F. C. "But, Sir, this is no answer to Mr.

Garrick's invitation."—Dr. Goth, "Why, I know I must go, or you will never let me rest: say, then, that I am too old to go abroad (though I had rather go to Hampton than to any other place); and that if he will be troubled with me, I must stay all night, for my horses are aged as well as myself, and cannot be hurried; so, if you please, name Sunday the 27th instant, when, if nothing particular happens, I will endeavor to go . . ."

Among the responses from Garrick:

My most amiable Friend

What a charming Letter have you written to me?—all the non-sensical Prescriptions of y^r. most learned Father could not have a ten thousandth part of the Effect upon my animal Spirits as your sweet Words have. There's Magic in Every Line—and Miss Hannah More swears like a Trooper that it is y^e best letter in y^e Language—We shall wait for Sunday with impatience . . .

My dearly beloved

We shall be most happy to see you & your Anti-Shakespeare Father on Sunday next—tho he has manifold Sins & much Wickedness, they shall be all forgiven on your Account . . .

How one would have loved to hear the anti-Shakespeare Cadogan teasingly allure the bard's greatest interpreter! Through Garrick, Cadogan met more of the immortals of the century, the "blue stocking" Elizabeth Montagu, the Sheridans, and the chatty Hannah More. On her numerous visits to London, Hannah More had frequent occasion to employ Cadogan as her personal physician and it was not unusual for her to visit the Cadogans at Fulham. Just one more letter concerning the death of Garrick from Hannah More to her sister:[36]

Adelphi, Jan. 1779.

. . . From Dr. Cadogan's, I intended to have gone to the Adelphi, but found that Mrs. Garrick was that moment quitting her house, while preparations were making for the last sad ceremony; . . . She told me they had just returned from Althorp, Lord Spencer's, where he had been reluctantly dragged, for he had felt unwell for some time; but during his visit he was often in such fine spirits that they could not believe he was ill. On his return home he appointed Cadogan to meet him, who ordered him an emetic, the warm bath, and the usual remedies, but with very little effect. On the Sunday he was in good spirits and free from pain; but as the suppression still continued, Dr. Cadogan became extremely alarmed, and sent for Pott, Heberden, and Schomberg, who gave him up the moment they saw him . . .

A few days later as the bells of St. Martins tolled mournfully, Hannah More and Frances Cadogan stood at Charing Cross to watch that unhappy procession of selected friends, including Dr. Cadogan in a place of honor, move slowly from the Adelphi to the Abbey. Is it not probable that the mezzotint of a cast of Garrick's face, and published April, 1779 by Pine, was done at Cadogan's suggestion?

To all the criticism directed at Cadogan after the appearance of his book on gout, he paid no attention. It was said that he would not condescend to answer. But unrecorded domestic difficulties probably played a part. Among the marriages for July 13, 1772, we read:

"Dr. Cadogan to Miss Groen, a Dutch Lady":

But this third adventure was less happy than the second for on the following October 19, "Mrs. Cadogen, wife to the celibrated Dr. Cadogen" died. He was now getting along in years and although his popularity had increased, his activities were more limited. He still was active at the College of Physicians being elected Censor in 1775 and Elect in 1781; and in 1792, he delivered his second Harveian oration. He was also mentioned as a medical assistant of the Society for the Recovery of Persons apparently drowned.

In 1778, his "agreeable daughter" was married at Fulham Church, to Wm. Nicholl esq., of the Middle Temple, barrister at law. It was Whitlock Nicholl, M.D. probably a grandson, who presented Cadogan's portrait to the College of Physicians.

Cadogan died at his house in George-street Hanover Square on February 26, 1797, aged eighty-six. He was buried in Fulham churchyard. A monument was said to have marked his grave, but recently, after careful search, the writer was unable to locate it. It has probably been destroyed meanwhile.

This is partly the story of a man who by his own efforts and application rose to be one of the most fashionable and well-liked physicians of London. He adorns the story of infant welfare.

JONAS HANWAY AND THE INFANT PARISH POOR

We have now to consider the life and endeavors of a great philanthropist, one who accomplished a great deal in the cause of the infant poor of the eighteenth century.

Jonas Hanway (1712–1786) was born at Portsmouth, in Hampshire and was the eldest of four children when his father died, and his mother took her family to London. At an early age he was apprenticed to a merchant in Lisbon. Later returning to England, he became interested in the development of trade routes to Persia. He travelled extensively from 1743 to 1750, his course taking him through Russia, Persia and Prussia. In the last place he became acquainted with Lieberkyn, physician to the King. Possessing the habit of noting his observations and thoughts, he published an account of his travels. Andrew Millar the bookseller, later bought the copyright and the book was widely read.

From 1750 to the time of his death, he remained in London and busied himself with many diverse and humanitarian interests. Hanway was a prolific writer and published a pamphlet or book on every one of his important undertakings. It is hardly possible to give a full account of his interests, but by his actions and his pen, he exerted an important influence in the paving, cleaning and lighting of the streets; in the founding of the Marine Society for encouraging wayward boys to enter the navy; in the opening of the Magdalene Hospital for penitent but unfortunate women; in the Stepney Society for the apprenticing of boys to the trades; in the relief of the distress of the chimney sweeps; and in the relief of the victims of the fire in Montreal (1765). Hanway was also a worker in the cause of the poor blacks. Incidentally he was said to have been the first to walk the streets of London with an umbrella.

But Hanway exerted his greatest influence in the cause of the infant poor and it is that phase of his work which is of interest to us. In 1758 he qualified as a Governor to the Foundling Hospital, studied its problems and attempted to be of service in the forwarding of this work. We have seen in the progress of the Foundling

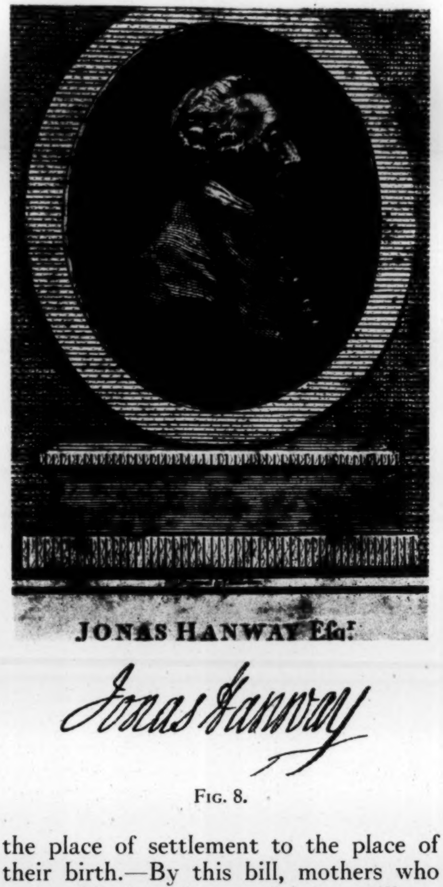
Hospital that promiscuous and unlimited admissions were defeating its very aims and to Hanway belongs some of the credit for checking this abuse.

Of tremendous importance however, were Hanway's contributions to the preservation of the infant parish poor. This was a problem very dear to his heart and the true character of the man is revealed in the story of his attempts towards its solution.

About the year 1757 Hanway's attention was turned to an investigation of the parish workhouses throughout the metropolis. It will be remembered that these institutions were an outgrowth of the poor laws of England which began in the forty-third year of the reign of Elizabeth and in brief, made it incumbent upon each parish to support its own poor. This they did by levying rates or taxes. The parish workhouse movement, beginning about 1723, was an effort to provide quarters for those poor who were not able to support themselves and of course this included infants. The condition of the infant parish poor was miserable beyond words but had escaped notice until the time of Hanway.

These infants included all those who were born in the parish workhouse and as the overseers were responsible for the welfare of the child, not only when it was born, but up to the age at which it could be apprenticed, these men took steps to see that no child was born within the parish limits who did not have a claim for support. This led to barbarous methods whereby even a mother about to lie-in was unceremoniously hustled out of the parish if she could not prove her right to a settlement. Such brutality was common until 1772:

> Leave was given to bring in a bill for more effectually preventing the concealment of bastard children, and for fixing the place of settlement to the place of their birth.—By this bill, mothers who are suddenly taken in labour, will no longer be subject to be removed from parish to parish, as has been frequently the case, but must be relieved immediately, and the child provided for, by the parish where they happen to be.



Jonas Hanway

FIG. 8.

The children who were "dropt" within the limits of the parish were in most instances brought to the parish workhouse. We hear very little concerning the fate of these children in the period 1725–1750. No one seems to say much about them, probably because their fate was the expected one and the knowledge was commonplace.

As the parish rates levied by the overseers constantly rose and were the subject of numerous complaints, the position of overseer became a thankless job and was avoided by men of respectability. An inferior group of men then came into positions that offered opportunities for graft and chicanery. There are many existing pamphlets and writings relating the abuses that these "wasps and hornets of society" practiced. When one reads of them, padding their lists of expenses with 1000 coffins when less than one-quarter of that number was necessary, and also buying 25 sets of bell-ropes in one year when one pair would last a decade, one is impressed with the need for reform. That this slipshod way of doing things was reflected in the care of the infants entrusted to the parish is not startling. These men in charge, admitting for the moment that some of them were upright, knew absolutely nothing concerning the proper care of infants and were only too eager to adopt the easiest methods. We have seen that when the Foundling Hospital was admitting infants promiscuously under the Parliamentary regime, the overseers were only too anxious to transfer their infants to that asylum and would even go so far as to snatch an infant from its mother a few days after birth and, in collusion with the father, while the mother was too weak from her confinement to offer much resistance, hasten to the Foundling for fear that the mother and infant would become chargeable to the parish. The infant would thereby lose its only chance for life, care by its natural mother.

"How many were torn by the Parish-officers from the Breast of the Shrieking Mother, with a View to *Save Expense* to the Parish will never be exactly known, more than the Number that died on the Road in bringing to the Hospital."

If perchance the overseers learned of an unmarried woman becoming pregnant they instituted a diligent search for the supposed father, not to exact from the culprit restitution for the woman, but to demand from him security for the care of the child, when they had any reason to suppose that the "cow and the calf" as the expression was, would become chargeable. This security was allowed to be paid in a lump sum, the father then becoming free and the overseer, knowing too well that the child's life was certain to be short, often spent this money for feasts and entertainment. And it was known that in some instances parish officers had even solicited for bastard children not born within their parish, in order to get the customary fee of £10 which was given with them.

These disgraceful episodes were frequently held up to ridicule by the satirist in caricature.[37]

The title of one play speaks for itself: "The Bastard-child, or a Feast for the Church-wardens. A dramatic Satire in Two Acts; as it is acted every Day, within the Bills of Mortality." By Sir Daniel Downright, 1768.

Of course these workhouses were not in any sense asylums for infant care. A newborn babe was put out to nurse and the overseers were out to drive a bargain. As a consequence women of the most unscrupulous habits and debauched beyond degree were entrusted with infant lives. Older children not requiring breast milk were entrusted to inmates but:

If the most able Nurse cannot perform Miracles, what is to be expected of a *poor, old, diseased,* and *decrepid* Woman? She is herself in want of a *Nurse,* and does not *see* nor *taste* if the Aliment be thick or thin, sweet or sour. And as to the Women who are neither aged nor diseased, their *being* in a Workhouse is a strong Indication of *Ignorance, Laziness,* or *Debauchery,* which by no means renders them fit to be trusted with the Care of young Infants. The Consequences prove this most demonstrably. I have heard it declared in *public Court* of one very important Parish, which in 14 years did not preserve a single child; and I have seen the Accounts of *another,* which acknowledged that out of 53, being the whole Number received in 5 years, not one was kept alive,—Is it not Time to alter our Plan?[38]

Such were conditions that Jonas Hanway undertook to rectify. He visited the parish workhouses to get first-hand information, not hearsay, and he found some startling and horrible circumstances. He met opposition and he made enemies, but he toiled on. Day after day with unwearied patience he visited workhouses in the mornings and consulted with members of Parliament in the afternoons, until there was passed in 1761 an "Act for the regular uniform annual Register of all parish poor under four years of age, within the Bills of Mortality." Hanway thought that when these registers were made public, parish overseers would be more careful in the treatment of infants and that each parish would strive to outdo the other in its welfare work. The act was received with enthusiasm by the common people and was called the "Act for Keeping Children alive." But although carried out in letter it wasn't carried out in spirit. Records were kept but incompletely. There was very little change in treatment although by this time a few parishes had raised the rates they were paying to nurses (one to two shillings a week was the price ordinarily paid for nursing a child) and offering premiums in case the nurse was able to keep the child alive beyond a certain time. But the act did more. It furnished Hanway with definite data, names, dates, etc., and with these at his disposal he carried on. He found for instance in the parish of St. Clement Danes, that 23 children had been committed to the care of Mary Poole, a nurse, and of these, 18 were dead within a year.

But permit me to ask, would not any man in his senses conclude, after the death of three or four children in one woman's hands, that the nurse was very unfortunate; and after five or six, that she was very ignorant or very wicked? But when in so short a period, the mortality of seven or eight had happened, would it not create a suspicion that she starved them, or gave them *sleeping potions?* And would not the same common sense and candor lead one to think, that upon seeing the *Eighteenth* child brought within this parish nurse's den, that those who sent them preferred that they should die? And what is preferring that a child should die, but something too shocking to mention or to think of? But it has been said and continues, in many parishes, to be so common a practice, that this violence on humanity has lost its name, and is become as familiar in these renowned cities, as the use of the bowstring in Morocco for those who offend their Emperor:[39]

The accompanying chart shows the results of his investigations of St. George, Middlesex. Hanway followed up the names of each child from year to year until he traced them to their ultimate fate.

REGISTER OF ST. GEORGE'S MIDDLESEX

Name of Child	Age			When Admitted into the Workhouse	By Whom Sent	When Died in the Workhouse	Days Lived
	Y	M	D				
Thomas Bailey	2		–	2 Jan.	Overseers	9 Jan.	7
Mary Bill		2	–	4	Churchw.	17 Feb.	43
Elizabeth Bill	1	11	–	4	Ditto	19 Feb.	45
Lucy Coleman		5	–	24	Overseers	11 March	47
Isaac Darling	2	3	–	5 Feb.	Churchw.	13 March	38
Ann Bailey	2	9	–	16	Overseers	29 Feb.	13
James Cloves	2	4	–	20	Ditto	14 March	23
John St. George F	2		–	21	Ditto	28 March	35
Susanna Downes	2		–	4 March	Ditto	15 March	11
William Chope B		2	–	28	Ditto	14 April	17
Mary Webb		8	–		Ditto		
Richard Yates		6	–	21 Nov.	Churchw.	Dead	
William Yates	2		–	21	Ditto	14 Dec.	24
Susanna Yates		4	–	21	Ditto	21 Dec.	31
Jane Dryborough	3	9	–	22	Overseers	Dead	
Elizabeth Hathaway	2	0	–	15 Dec.	Ditto		
Benjamin Tompkins	2	3	–	19	Ditto	Dead	
William Carns	3	4	–	19	Ditto	Dead	
Peter Flidgard	2		–	20	Churchw.		

Thomas Beal, Churchwarden.

This is a true and exact copy of the register of this parish in 1765, except the additional column of the days the children lived, and the four marked Dead, who died within two months after the year expired . . .

I have also exact information concerning the fortune of the remaining three infants. Mary Webb, Elizabeth Hathaway and Peter Flidgard were taken out by their mothers. These three only have escaped with their lives, and so far we must give the parish credit, and no further; the two last were but a little while in the workhouse.

He also found that in the parish of St. Luke, Middlesex, Lambeth and St. James, Westminister, that "the discharged and dead balance the born and received: So that not one child was reared." The parishes of St. Giles, St. Andrew-above-Bars, and St. Martin-in-the-Fields fared little better and he concluded that the mortality of all children received was 80 to 90 per cent "or, if you please, upon those received under 12 months old, 99." He estimated that well over 1000 infants were brought to workhouses annually.

Hanway did not stop until he had collected evidence in all parishes to show that even in the best of them an infant had practically no chance of being reared. He then compared these results with the records of the Foundling Hospital where the infants, in most cases just as delicate when received, were sent to the country to be nursed. He also found that in some country parishes, particularly at Stevenage, the children did much better. He published facts, too numerous to mention, that would support his contention that children when received into the parish workhouse should immediately be sent to the country to be nursed; and estimated that by these means 300 infants' lives could be saved annually in London alone. At length by his own endeavors he was responsible for the passage of an Act* which directed that "all Parish Infants belonging to the Parishes within the Bills of Mortality, shall not be nursed in the Workhouses, but be sent to nurse a certain number of miles out of Town, until they are six years old, under the care of Guardians, to be elected triennially, for the express purpose of taking Care of them."

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* June 29, 1767. 7. Geo. III cap. 39.

In brief this act stated that children from two to six years of age were to be sent at least three miles into the country, those under two years to be sent five miles. For nursing and maintenance of a child under six years a nurse was to be paid 2s.6d. per week; and not less than 2s. for those over six years. The act also provided for a reward of 10s. if a child under nine months of age lived a year. Separate guardians for the parish poor children were also stipulated.

The difference in the mortality of children raised in the country over those raised in the city was attributed to the change in air, but it must not be forgotten that there was a total change in environment and more particularly these infants were entrusted to women whose natural instinct toward infants had not been warped or contaminated by city living.

One first supposes that the reason that we do not hear very much of Hanway's efforts today and that his memory is more or less obscure is that he was working with conditions peculiar to the eighteenth century. But it is just as true today that wherever infants are crowded together under conditions of filth and negligence and more particularly when they are entrusted to those who have not the spirit at heart, their fate is similar. Witness Walker's "Traffic in Babies" published in 1918.

It is hard to estimate the practical results of Hanway's endeavors. Contemporary literature was almost unanimous in its praise. "The humane regulations of the infant poor law took place in the year 1768, and have most probably from that time to this annually preserved the lives of upwards of 2000 persons."

This was written in 1783 but the figures were questioned. At any rate infant mortality did fall, but regardless of the exact figures it cannot be denied that the people were again awakened to the cries of infancy and there was a tremendous change in the public conscience toward an infant. All of this was necessary before any decided and lasting reduction of mortality could be accomplished.

It is of interest to observe the treatment of the infant poor in St. James Westminster in the year 1797. The children were placed on Wimbledon Common and the nurse was allowed 3s. a week for their maintenance. If a child recovered from any illness or an infant lived a year there was a reward of one guinea. A surgeon and an apothecary were appointed to watch over their health. They were inoculated for smallpox. A reward of 5s. was paid if a child recovered from measles or whooping cough. On the other hand if two children died under the care of any one nurse within a year, she was discontinued as it seemed to imply "a want of skill or attention or both." Surely such humane regulations were a great advancement over the conditions of 1750, even though the actual result is difficult to estimate mathematically.

Jonas Hanway was a prolific writer and published some seventy articles in thirty years. He was verbose, reiterative and at times his arguments do not sound too logical, but he had a passion for doing what he thought was right. There is a vein of sincerity in all his works and we must hesitate to criticize a man who considered it his duty to his God and to his country to espouse the cause of helpless innocence and who could say: "I write with tears in my eyes to bemoan the fate of so many subjects and innocent persons brought to an untimely end, not with a dart in my hand to avenge their death."

Hanway's efforts were appreciated by the people of his time. He was described as beneficent, indefatigable, persevering, astonishing and successful. His biography written after his death in 1786 went through three editions. A memorial was erected in Westminster Abbey and he was hailed as "one of the most distinguished Philanthropists of this or any other age or nation."

Surely here is a layman who deserves an important place in the story of infant welfare.

George Armstrong and the First Dispensary

One of the first of the English physicians to devote his time entirely to the care of children was George Armstrong, a pediatrician of unusual powers of observation, and a noble benefactor in the cause of infancy. Little appreciated by his contemporaries, which accounts for a paucity of biographical material, this originator of the dispensary movement seems only recently to be coming into his own. His original description of pyloric stenosis is enough to establish his fame, but it is doubtful if Armstrong himself would have considered that his most worthy contribution.*

Armstrong came from an educated family. His father, Robert, was minister at Castleton (1693–1733) and a brother, William Armstrong A.M. succeeded as minister from 1733–1751. Another brother, John, the famous poet-physician was graduated M.D. from Edinburgh in 1732, and shortly after came to London, where he published his best known work, "The Art of Preserving Health."

Little is known of the early life of George. We first hear of him as practicing pharmacy in Hampstead. About the year 1764 he began to devote his time to the care of infants and children and shortly after (1767) published "An Essay on the Diseases most fatal to Infants."

The book made a favorable impression and was well received. Hanway mentioned "the ingenious Dr. Armstrong" and further stated ". . . it is not Dr. Armstrong who has written an Essay on the Diseases most fatal to infants,—but Mr. George Armstrong, surgeon and apothecary at Hamstead: it has not therefore the less merit; surgeons and apothecaries are oftener called for to cure children than many physicians of the greatest eminence." Underwood had frequent occasion to mention Armstrong's book "which has passed through various editions and undoubtedly had the great merit of having led the van, and paving the way for the great improvements made in the treatment of the diseases of children."

Our interest in Armstrong lies in his connection with the Dispensary for the Infant Poor which was founded April 24, 1769, "the first and only charity of the Kind that had ever been established." It was generally stated that Armstrong "was appointed" as physician to the dispensary, leading to the belief that the institution was in existence before his appointment. This however is misleading. If we may be allowed to speculate in the absence of known facts, it is not at all unlikely that this institution was conceived in the minds of the two brothers. John Armstrong was in London at the time, and although of a peculiar temperament, had many influential friends. It will be remembered that Hanway's investigations among the infant poor were receiving a good deal of publicity and John saw an opportunity for his brother, especially as the latter's book had been so favorably received, to come to London and establish a dispensary, not only as a charitable institution, but as a means of livelihood. At any rate in 1769, some printed proposals were distributed among friends, calling attention to the fact that sick children under the age of four were not admitted to any of the existing institutions, and in which was proposed a means whereby the industrious poor could receive advice and medicine for the children *gratis.*

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*Since this article was written, it has been found that Armstrong's description of pyloric stenosis was not the earliest. Dr. G. F. Still of London has found a case, published by Christopher Weber in 1758, and the author has found a case described by Patrick Blair in 1717.

An hospital where infants could be kept, was not considered feasible for many reasons, particularly because of the contagiousness of children's complaints and the necessity of separating them from their mothers. And so a new sort of institution was conceived, a dispensary. The plan matured and in April a house was opened in Red Lion Square (East Street), four days a week (afterwards three) for the reception of poor patients, and the remaining days for private patients. The dispensary was an immediate success: 696 patients were admitted the first year. The second year 1296 patients were admitted and the following year 1313. It was then proposed to limit the admissions to those recommended by subscribers, but this idea was abandoned.

Sir John Fielding, half-brother of the illustrious Henry and who carried on the latter's endeavors to correct social conditions among the poor of London, spoke publicly in March, 1770:

> The worthy and ingenious Mr. Nelson, in a book, entituled, "An Address to Persons of Quality and Estate," relative to the different methods of doing good, seems from the benevolence of his mind, and from that rich fountain of humanity in his heart, to have furnished hints for almost all the charities which have been established since his time; and, indeed, from the present number of them, one should imagine, that scarce a distress could arise to the poor, but there is an hospital, infirmary, or asylum to relieve; yet alas, how short-sighted is the eye of man! for, behold a new charity makes its appearance, of a most striking nature indeed; namely, a Dispensary for the benefit of the infants of the industrious poor; and how objects so essential to the community should have been so long overlooked by the ingenious and benevolent, is very surprizing. The fate of those children that have fallen to the lot of workhouses in their tender state, has been proved beyond contradiction, to have been dreadful to the last degree; few, indeed, of such lives having been preserved. For this evil some remedies have been provided by law, which, I hope to God, may prove effectual. The next class of distressed objects of this Kind are, the infants of the industrious poor, who, being careful and temperate, have frequently large families, which they may indeed subsist, but numbers of these sort of children are precipitately snatched from the fond mother's embrace by sudden diseases, which the poverty and ignorance of the parent render them incapable of contending with. The lives of children hang on a slender thread, and their diseases, though few, require immediate and able assistance: behold then Armstrong's Dispensary opening its bosom for the relief of these tender

> patients! It seems a work of supererogation to recommend such a charity as this; it speaks for itself, and needs but to be considered, to be encouraged; and to the mother's breast it speaks a feeling language indeed; for the experience that may be acquired in the knowledge and cure of diseases incident to children, by this institution, may be the happy means of preserving heirs to many valuable families, and of preventing much of that sorrow which swells the mother's heart when the little object of her affection is snatched from her tender arms.[40]

As Fielding intimated, all sorts of charitable institutions were calling for support, which may in part explain the apathy of the people of rank towards this new institution. Although a fostering haven for the afflicted infants of the poor, it seemed to have been totally ignored in the public press. But Armstrong's zeal was not easily quenched. He kept close records of admissions and of his results and thus was able to convince his subscribers of the usefulness and popularity of the dispensary. But as most of the financial burden of its upkeep fell upon him, it was decided to form an organization upon the plan of other institutions. Accordingly a meeting was held at the Adelphi Tavern in the Strand on April 2, 1772, and many men of position and consequence were selected as officers. The Right Honourable the Earl of Winchelsea "who very generously directed fifty pounds to be paid, annually, towards the support of it, while it subsisted" was elected president; Sir John St. Aubyn, Sir Watkins Williams Wynne and Sir George Cornewal, vice-presidents. Dr. George Armstrong was chosen as physician in ordinary; and as consulting physicians were selected Sir John Pringle, Bart, (one of Armstrong's illustrious countrymen and to whom his first edition was dedicated as a testimony of esteem and gratitude), Drs. Brockelsby, Warren, Turton, Hunter (the Armstrongs were intimate with the Hunters), Watson, Huck, James Ford, Garthshore, and John Armstrong. It was decided that the quarters were insufficient for the proper care of the patients and a larger and more comfortable place in Soho Square was taken.

From this time, its popularity increased quite rapidly, the people coming from great distances and "from most of the villages within eight or ten miles of London; as Greenwich, Mitchom, Croydon, Hounslow, Harrow on the Hill, and Hendon." In the years 1778 and 1780 there were treated an average of 4000 cases annually.

Armstrong points with pardonable pride to "a further circumstance in recommendation of this charity in which it differs from all others . . . that it receives children without any letters of admission, provided the parents are really indigent, the case dangerous, and requiring speedy relief." It is to be remembered that these indigent poor often found it very difficult to gain admissions to hospitals; for the difficulty of obtaining letters from governors and guardians, whose whereabouts were unknown to them, tedious waiting for the "taking-in days," tipping and bribing the nurses, beadles and others upon whose services they relied, were some of the causes of delay and complaint. The abolition of this red-tape was in itself a worthy innovation. The few rules to be observed by the patient were of interest. They were required to be neat and clean, to preserve order, to return thanks for treatment and to report on the subsequent progress of the case.

Charity sermons were a frequent occurrence at this time and the rhetorical eloquence of some noted preacher was often utilized for the financial advantage of struggling but worthy charities. We have noted Sterne's sermon for the benefit of the Foundling and others are too frequent to mention. About this time there flourished a unique figure in the Rev. William Dodd, who had become quite famous as a preacher. He had been a tutor to Phillip Stanhope, heir to Lord Chesterfield and had gradually risen to a position of fame and distinction. The Chaplain in ordinary to his Majesty was frequently invited to preach charity sermons, and his name was particularly connected with the Magdalen Charity in which he was greatly interested and to him we are indebted for an account. Dodd found, however, that his financial income did not keep pace with his social aspirations and in a moment of rashness, forged a note in the name of Lord Chesterfield. He was detected, tried and sentenced to be hanged. Samuel Johnson and thousands of others appealed in his behalf. The King was sympathetic but Dodd's offence would admit of no alleviation and his checkered career ended at Tyburn. At the time when Dodd was at the height of his popularity and was being "cried up as the first preacher in London" he was requested to preach for the benefit of Armstrong's Dispensary. On Tuesday April 27, 1773 at the parish church of St. Martin-in-the-Fields, he preached a sermon entitled Compassion to Infants Enforced which was subsequently published at the request of the officers and guardians of the dispensary.

The wealth of material at the dispensary combined with the rare diagnostic acumen of Armstrong gave to pediatrics a book of considerable value for, like all the previous important contributors to medicine, Armstrong relied upon what he saw rather than upon what he read. ". . . this treatise upon the diseases of children is the result of my own experience, and not a collection from other authors, . . . " which is apparent when we find observations new to infant welfare and treatment. The now famous original description of pyloric stenosis was the result of a painstaking investigation and accurate description of his autopsy findings on a case of "watery gripes.". Although cases of whooping cough were not actually admitted, he prescribed for them and mentions having treated 700 such cases in about eight years. The subsequent editions of his work entitled "An Essay on the Diseases most incident to Children" 1771, 1777 and 1783, were enlargments upon the original and contain many observations made at the dispensary.

Advances in medicine are frequently made by exposing false old doctrines as well as by the introduction of sound new ones. Just as William Cadogan had entertained a healthy nihilism concerning the drugs at his command in the treatment of chronic diseases, believing that the best treatment was prophylactic, so George Armstrong entertained a healthy skepticism in matters of diagnosis. The following are examples:

> . . . Convulsions, for the most part, close the scene in adults, as well as in infants; but because they die convulsed, we do not therefore say that they die of convulsions, though this is constantly said with regard to children, merely

> through the ignorance of persons about them, who do not know what other name to give to the disease. Hence, in the weekly bills of mortality, convulsions are always said to sweep off great numbers of children.
>
> I come next to teething, which in the same manner as was observed on convulsions, is said to carry off a much greater number of children than it actually does; for almost all children that die while they are about teeth, are said to die of teething . . .
>
> Though Worms by many people even in the physical line, are reckoned one of the principal sources of children's complaints yet I cannot help thinking, that Worm cases more rarely occur than is commonly imagined . . .

Surely, as Ruhräh observes, he was ahead of his time. And more important still, in the light of twentieth century infant welfare, we read: "But in conducting the physical department of the Dispensary I did not confine myself to the therapeutic, or curative part of physic only; I likewise extended my care to the prophylactic branch, or that which concerns the prevention of diseases, constantly endeavoring to hinder their being so frequent, or so violent, when they happen."

In the development of infant welfare in the eighteenth century, Armstrong was responsible for still another progressive step. We have seen that for the sake of fashion many mothers had neglected nursing their babies. Even the earlier pediatricians had written in no uncertain terms their opinion of these fashionable ladies. "Not worthy of the name of mother" seems to be the oft-repeated phrase. But although the pendulum was swinging in the right direction it had swung too far and with George Armstrong we see a turn in the other direction. He appears to be one of the first to realize that fashion alone was not responsible in all cases and that there were many mothers who would, but could not, nurse their offspring.

> Though I am no advocate for bringing children up by hand, as it is called, when they can be properly suckled; yet as some mothers, for want of health or sufficient vigour of constitution are not able to suckle their infants themselves nor willing to commit them to other hands for that purpose: as there are some whose nipples are too small or perhaps, so ill-formed, that the child cannot lay hold of them, and some whose situation in life will not allow them to perform this duty; not to mention, besides, that there are infants who will not take the breast: I thought it might not be impertinent to offer a few directions about *dry-nursing;* for which I reckon myself the better qualified, that I have had some experience of it in my own family.

For this he was severely criticized.

> . . . But neither the "grandmother," nor Dr. Armstrong, nor any other of the advocates for *dry nursing*, seem to be aware of the great fatality which attends the attempt thus to rear children. It has been a part of my duty to endeavor to ascertain the amount of mortality among infants from this source, and after much careful inquiry and investigation, I am convinced that the attempt to bring up children by hand, proves fatal *in London*, to at least seven out of eight of these miserable sufferers, and this happens, whether the child has never taken the breast at all, or having suckled for three or four weeks only, is then weaned. *In the country*, the mortality among dry-nursed children is not quite so great as in London, but it is abundantly greater than is generally imagined.[41]

Underwood wrote, "Though apparently an advocate for suckling, he has laboured for arguments to apologize for the spoon and the boat in too many instances."

But regardless of mortality, succeeding pediatricians adopted Armstrong's suggestions and from his time on, we read that dry-nursing is better then poor wet-nursing and the directions for choosing a wet nurse which occupied such an important place in the earlier pediatric texts becomes replaced in the textbooks of today by chapters upon infant feeding.*

In 1770 there had opened another dispensary in London to which was attached as attending physician John Coakley Lettsom, M.D., F.R.S., and F.S.A. Lettsom was extremely popular among his colleagues and with the public. No medical man had his name so constantly before the public and very few had larger incomes. Poems were written about him and Boswell styled him "the city's first physician." His memory is kept alive from his intimate acquaintance with Fothergill and Rush. I have no intention to belittle John Coakley Lettsom but his fiery disposition was many times the cause of indiscretions. Lettsom had meddled with the elections at the Finsbury dispensary in 1786 for which he was severely criticized; he had also paraded before the public a personal dispute with Baron Dimsdale; besides vigorously opposing Withering's observations on the foxglove. Soon after the appearance of the third edition of Armstrong's book (1777) Lettsom let forth a vitriolic attack on Armstrong's character which he published in the *Gentleman's Magazine*. Among other things he said that Armstrong showed "a want of genius, or, what is more reprehensible, a want of integrity." The letter was occasioned by Armstrong's observations on whooping cough. Armstrong had mentioned in 1767 the use of an antimonial solution which he, from want of any knowledge of its previous use, had considered his own discovery. In 1774 Wm. Butter's book on this disease appeared in which an extract of hemlock was recommended. Later in 1774 Lettsom wrote testifying to the value of another remedy, cantharides and quinine, which he had learned from his preceptor, Mr. Abraham Sutcliff, who in turn had borrowed it from the original contribution by John Burton back in 1738. Armstrong merely mentioned what Lettsom himself acknowledged; namely, that he (Lettsom) had rejected Butter's remedy without ever having tried it. This aroused Lettsom's ire and he let go. He wrote bitterly that Armstrong evinced "Little faith he had in his own assumed discovery, or a warm disposition to try experiments in a very serious and dangerous disease."

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* If we need any further evidence to prove the accuracy and keenness of Armstrong's observations, let us look at him in the light of some ultramodern science. Watson and his co-workers have constructed their theories of "Behaviorism" on some fundamental psychological experiments with very young infants.[42] Among other things they observed that "the only thing the child is afraid of at birth is either a loud sound or the loss of support" (p. 42) and "Our laboratory studies show that we can bring out a love response in a newborn child by just one stimulus—*by stroking its skin* . . ." (p. 71) Now let us read what Armstrong wrote a century and a half ago:

> Neither should they be hoisted up high in the air between the hands, as some people heedlessly do; for they begin very early to be susceptible of fear; much sooner than persons not accustomed to them would imagine. It is true, they may be brought to bear pretty hearty shaking, swinging, and even jolting, by degrees; and all this is of service, when they have strength to undergo it; nay, when the child bears it well, we reckon it a good sign that it is thriving, and has been well nursed; but it should be done very gradually, and not attempted too soon. I have seen an infant almost thrown into fits, from a sudden swing given to it by one not used to young children. And how often do we see them start violently, and fall a crying, if there happens to be any sharp sudden noise made near them, in consequence of the weakness and sensibility of their nerves.
>
> But the most useful exercise for very young infants, is rubbing with the hand; which cannot be too often repeated, nor continued too long at a time . . . There is nothing that infants in general seem more delighted with than this exercise, and it were to be wished that, the nurses would indulge them more in it. It will frequently make them quiet when nothing else will, and it is not only very pleasing to them, but conduces greatly to make them thrive . . . [p. 174 et seq. 1783 Ed.]

The following December Armstrong replied and answered satisfactorily every question, besides manifesting a subtle but gentle sarcasm. "There are instances of men of genius, even, perhaps, of greater genius than Dr. Lettsom himself, who have assumed the discoveries of others."

The two dispensaries vied with each other for popular approval and I dare not accuse Lettsom of jealousy; but to any lover of Armstrong such sentiments flash across the mind. When Lettsom wrote that the dispensary for inoculation was the only place where the infant poor could be inoculated he was again attacking Armstrong. There can be no doubt that the overweening, vain, albeit popular Lettsom fairly cowed the reticent spirit of Armstrong and contributed to his undeserved obscurity. Our hearts go out to Armstrong when he writes:

> I hope that I may be allowed to look upon myself as being at least as cautious as Dr. Lettsom in trying experiments in physick; and I know, as well as the Doctor can tell me, how serious and dangerous a disease the hooping-cough is. But I have no *warm disposition*, as the Doctor expresses it, to reject successful experiments made by others in physick, without trying them, as Dr. Lettsom evidently has done.

We can conclude that Armstrong was sincere and if he had tried many remedies for such an obnoxious disease as whooping cough, it was merely because he made an earnest effort to find the most efficient one. He had no desire to parade his knowledge before the public "well knowing that disputes of this kind never do any good . . . " He displayed sound judgment when he considered it necessary to take into consideration the individual case, the time of year, and the severity of the epidemic, in the evaluation of any remedy. Armstrong rightfully resented being unjustly accused of plagiarism.[43]

Armstrong's book was reprinted as late as 1808, and was translated into German and Italian. Rees mentions that he was assisted by his brother John in writing it. The printing of the book was by T. Cadell which was no chance coincidence. John Armstrong was one of that large group of illustrious Scotchmen who came to London in the first half of the century and established enviable reputations. Andrew Millar was another. He became one of the most notable printers of the period. John Armstrong and Millar were close friends and it was to be expected that when George published his book, he had it done by Millar or his apprentice and successor, Thomas Cadell.

Concerning George Armstrong's life, we know very little. He mentions the successful bringing up "by hand" of three daughters. When John died in 1779, it was to these three daughters that he left his fortune of 3000£. John was buried in Covent Garden Church near that illustrious surgeon Richard Wiseman. Incidentally the parish register records under the date of Sept. 15, 1779:

Doctor William Armstrong in Ye Vault
Under Communion Table.

George Armstrong is said to have been born about the middle of the eighteenth century in London, where he died in December 1781. (Nouvelle Biographie Générale.) Baas also gives the date of his death as 1781, as does the Index Catalogue. These authorities are obviously in error for from his own writings we gather that he was alive "for some time" after the dispensary was closed.

Foote says: "This keen observer, brilliant writer and pioneer physician-philanthropist, who was blessed with the true scientific spirit and an almost prophetic outlook, died in obscurity, unpraised and unrewarded excepting in the grateful remembrance of the poor of London."[44]

There were many Armstrongs in London at that time and not a few "Doctor" Armstrongs. George was not an uncommon name in the numerous Armstrong family, all of which makes death notices difficult of identification. In the *Gentleman's Magazine,* however, there is an entry which may be of more than passing interest. For Sept. 2, 1782 it reads "Mr. Armstrong, surgeon, in Bishopsgate Str., whose death was occasioned by a fall from his horse." If this can be accepted as referring to our own Armstrong, then we must conclude that the 1783 edition of his work was published posthumously, not an improbability in that his death was sudden. At all events he was survived by a widow and three daughters, Mrs. Armstrong being alive in 1795.

The dispensary was closed in December 1781, having admitted 35,000 patients in its brief existence. Buchan is responsible for the statement that it was closed from lack of funds but Armstrong gives a different reason.

> But as that charity has been at a stand for some time on account of my bad state of health which put it out of my power to attend it [he was stricken with a "paralytic complaint" about this time] I shall not trouble the Public with a particular detail of the institution, contenting myself with explaining the nature and usefulness of it, which, perhaps, may some time or other induce some other person to take it up.

Before closing let it be stated in connection with the contention that Davis was the originator of the modern visiting nurse movement that Armstrong had written "it is proposed, as soon as there shall be a sufficient subscription, to engage proper assistants, to visit (within a limited distance) at their own homes, such poor children as are not in a condition to be brought out, and supply them with proper medicines."

Thus we close our account of the first dispensary and can readily believe that "no charitable institution was ever established whereby so much good has been done or so many lives saved at so small an expense." This concludes our incomplete picture of one of the foremost benefactors of the infant poor, a man whose efforts were worthy of considerable appreciation but whose life story lies buried in obscurity.

CONCLUSIONS AND COMMENT

There were other contributions to infant welfare that may be mentioned in passing. Downman's poem on "Infancy" and the revival and translation into English of the early pediatric poems as related by Foote, were evidences of a revival of interest in this field.[45]

There were many expressions at the turn of the century that show an improved state of affairs.

Of interest is the report of the Foundling Hospital in 1798 in response to a communication from a similar institution in Dublin where the mortality continued to be over 99 per cent. "The present management and care of the children is more successful; the average of those who have died under twelve months in the preceding ten years, being only one in six; and, for the last four or five years, even less than that proportion."[46]

"Dropping of children is but little known at present," wrote Malcolm, the historian, in 1808.

Dr. Hamilton, a busy practitioner, wrote: "The accident of the infant being overlaid is so uncommon, that the author has never met with a single instance where he could ascertain that the infant was lost from that cause."[47]

"There are no such groups of half-starved, miserable, scald-headed children with rickety limbs and bandy legs as there were in the days of my youth, neither is there anything like the same mortality among them." (Francis Place, 1824.)[48]

"Before this benevolent measure [Hanway's Act of Parliament, 1767] took place, not above *one* in *twenty-four* of the poor children received into the work houses lived to be a year old; so that out of two thousand eight hundred, the average annual number admitted, two thousand and ninety died; whereas since this measure was adopted, only four hundred and fifty out of the whole number die; and the greatest part of those deaths happen during the three weeks that the children are kept in the work house."[49]

More recently it has been calculated that the mortality rate in London for children under five years was 66.2 per cent for the period 1730–1779; whereas from 1780–1829 it was reduced to 37.7 per cent.[50]

I do not wish to leave the impression that evidences of neglect and cruelty had vanished. Infanticide was a problem of tremendous importance throughout the nineteenth century, but it was combated as such and not confused with natural deaths.

In contemplating the foregoing facts, we face certain questions which cannot be easily answered. Was Gibbon justified in his comment on the tremendous infant mortality, as "the imperfect workmanship of nature?" In other fields of biology we find a similar waste of life or apparent "imperfect workmanship." In the life cycle of the fish, frog, spermatozoa, etc., the law of luxus secretion is in evidence. Millions of potential beings never reach maturity. Is the natural means of propagation for the human species, one that produces large numbers of individuals with a consequent high mortality; or is our present reversed method the natural one? Do we contemplate with horror the tremendous infant mortality of the other centuries merely because we are not accustomed to it, or do we shudder because of some innate reaction? The majority of the people of the eighteenth century were not greatly concerned about it.

What is the relation between infant mortality and birth rate? Holt suggested that because of wars and the consequent annihilation of the race, the people, especially of France, turned their attention to infant mortality with a view of saving more individuals for the state.[51] This theory suggests that a lower birth rate precedes a lowered mortality. But do not the facts of the eighteenth century suggest a reverse theory?

When man by the application of his knowledge of the various sciences artificially reduces the natural infant death rate, will it not be a necessary corollary that the birth rate must fall? So much seems certain, infant mortality and birth rate vary directly. The people of the eighteenth century had very serious problems of employment, housing, food, and transportation that would have been magnified beyond contemplation had the infant death rate been as low as it is as present.

Consider another aspect of this tragic history, the influence of female fashion on such a fundamental thing as breast feeding. The sugar-loaf shape was directly responsible then, but it must be admitted that the fashion of the slim figure is a persistent one. We still hear it whispered that nursing a baby makes one fat and even today there is ample evidence that many women purposely avoid it "to preserve a shape and avoid a little trouble." Not that we should hold the women responsible. Those who apply their theory of evolution can respond that it is the discriminating eye of the male that sets the fashions of the female world. But the male has no control of his "discriminating eye." We are all mere puppets in a vast production. But when the natural method of rearing young can be cast aside so lightly, one is nearly ready to believe that this most fundamental of instincts is after all a conditioned reflex. Or else that which we vulgarly term sex-appeal is more fundamental than mother love. It is a hard theory to cherish.

Was George Armstrong right, in the face of a high mortality to advocate artificial feeding? Was he too far ahead of his time? I believe we owe a debt of gratitude to Armstrong. There are many examples in the practice of pediatrics to justify Armstrong's belief that not all mothers are negligent who do not nurse their babies. Artificial feeding of infants has reached its present state of success through long periods of trial and error, together with the gradual application of knowledge derived in other fields of science. It is quite possible that this knowledge would never have been applied to infant feeding unless there was the demand for it, and if not for Armstrong and other pioneers who could brave criticism, we would very likely still be at the mercy of the unprincipled and mercenary wet nurse.

So let us cherish the memory of the men who were responsible for a 25 per cent fall in infant mortality: Coram, Cadogan, Hanway and Armstrong.

SUMMARY

This is a story of the progress made in infant welfare in the London of the eighteenth century. A study of the Bills of Mortality and of the literature of the period previous to 1740 shows that the infant mortality was tremendous but did not cause a great deal of concern to the people. Children were not considered of much importance. They were neglected by the medical profession chiefly because obstetrics was still an undeveloped science and was in the hands of the midwife. As the person who delivered the child was supposed to take care of it after its birth, the care and diseases of infancy were left to the so-called nurses and old women. Physicians seldom had the opportunities to observe and were consequently ignorant of infant troubles. Among the higher classes, parents considered

THE LONDON GENERAL BILL OF CHRISTENINGS AND BURIALS FROM DECEMBER 16, 1740, TO DEC. 15, 1741

Christened 14,957—Males 7667
—Females 7290

Buried 32169—Males 15465
—Female 16704

Increases in the Burials this year 1358

Died under 2 years of age	10456
Between 2 and 5	2368
5 and 10	1072
10 and 20	1048
20 and 30	2816
30 and 40	3476
40 and 50	3731
50 and 60	2851
60 and 70	1933
70 and 80	1540
80 and 90	734
90 and 100	130
100 and 106	14

Diseases	
Abortive and Stillborn	548
Aged	2512
Ague	3
Apoplexy & Sudden	230
Asthma & Tissick	646
Bedridden	17
Bleeding	5
Bloody Flux	20
Bursten and Rupture	16
Cancer	62
Canker	5
Childbed	256
Colick, gripes, twisting of the gut	258
Consumption	4981
Convulsion	8250
Cough, and Hooping Cough	109
Diabetes	3
Dropsie	1058
Evil	31
Falling Sickness	1
Fever, Malignant Fever, Scarlet Fever, Spotted Fever & Purples	7528
Fistula	16
Flux	31
French Pox	128
Gout	46
Gravel, Stone and Strangury	53
Grief	10
Headach	1
Headmouldshot, Horshoehead & Water in the Head	129
Jaundies	161
Imposthume	25
Inflamation	33
Itch	5
Leprosie	9
Lethargy	6
Lunatick	71
Measles	42
Miscarriage	5
Mortification	282
Palsie	48
Plurisie	44
Quinsie	13
Rash	6
Rheumatism	26
Rickets	50
Rising of the Lights	13
St. Anthony's Fire	5
Scald Head	2
Small Pox	1977
Sore Throat	3
Sores and Ulcers	19
Stoppage in the Stomach	197
Surfeit	8
Swelling	3
Teeth	1501
Thrush	158
Tympany	2
Vomiting and Looseness	20
Worms	16
Casualties	
Broken Limbs	7
Bruised	3
Burnt	2
Choaked	1
Died by the cutting off her Breast	1
Died of a Wound	1
Died in the street	1
Died by the Bite of a mad Dog	1
Drowned	116
Excessive Drinking	56
Executed	7
Found Dead	71
Found Hang'd	1
Fractured Skull	5
Frighted	1
Kill's by the kick of a Horse	1
Kill'd by Falls and several other accidents	43
Made away themselves	51
Murder'd	8
Overlaid	70
Scalded	2
Shot by accident	2
Stabb'd	1
Starved	13
Suffocated	1

it beneath their dignity to be concerned with the care of their children, nor did they wish to be disturbed by the numerous ailments of the child. The lower classes became callous to a high infant death rate, fundamentally because of poverty and secondarily because it was considered unavoidable. Considering their occupation as a business instead of a profession, insensate nurses can be held responsible for a greater part of this waste of life. Cruelty to children and infanticide were rampant.

In the late seventeenth and early eighteenth century there were some efforts made to better the condition of the child, none of which was of much importance.

With the opening of the Foundling Hospital in London, due chiefly to the efforts of Thomas Coram, there appeared unmistakable evidence of an awakened interest in this field. This hospital was not of much importance in the history of hospital development or in the development of medicine, but one can hardly read the literature of 1740–1750 without realizing that it attracted the attention of all classes of people. There was a marked wave of enthusiasm that greeted its opening and there was a noble response on the part of the profession, of the divines, the artists, the nobility and even of the common people. This marked the dawn of a new day and was not without its influence on pediatric literature. This interest in children, particularly foundlings, was directly connected with the appearance of the first great English novel.

The publication of Wm. Cadogan's famous "Essay on Nursing" which revolutionized the treatment of infants, particularly in their dress, can also be traced as an effect of the opening of the Foundling. The fact that this "Essay" went through ten editions was evidence of its worth.

Jonas Hanway, the philanthropist, first became interested in children through his connection with this hospital, but his field of endeavor was extended to include the infant parish poor. The populace was astounded at the conditions he unearthed which had been going on for a long time. His success in stimulating Parliament to enact laws for the relief of these infants is of great moment.

Finally, although the facts are wanting, this interest in the infant parish poor was perhaps directly responsible for the opening of the first dispensary by George Armstrong. This was the beginning of the dispensary movement which has since occupied an important place in English medicine. The success of Armstrong's dispensary until closed by his own poor state of health, gives further evidence that infancy was gradually rising from the state of helplessness and despair.

REFERENCES

16. STOW, J. Survey of London, 1598. Everyman's Library Edition.

17. Account of the General Nursery or Colledg of Infants . . . Lond. 1686, p. 3.

18. A Scheme for the Foundation of a Royal Hospital . . . By, and for the Maintenance of a Corporation of skilful Midwives and such Foundlings, or exposed Children . . . As it was proposed and addressed to his Majesty King James II. By Mrs. Elisabeth Cellier, in the mouth of June, 1687. F., 9 pp. Reprinted in Harleian Miscellany. Lond., 1810, Vol. 9, p. 191.

19. MAITLAND, W. History of London, Samuel Richardson 1739, p. 673.

20. HANWAY, J. Candid Historical Account of the Hospital for the Reception of Exposed and Deserted Young Children. Lond., 1759, p. 15.

21. The Countess of Lincolns Nursery. At Oxford, printed by John Lichfield and James Short, Printers to the famous University, 1622. Quarto, containing twenty one Pages. In Harleian Miscellany, Lond., 1809, 3, p. 453.

22. TILLOTSON, DR. J. WORKS. Ed. 5, Lond., 1735. Vol. I, p. 486. Sermon LI.

23. SWIFT, J. Modest proposal for preventing the children of poor people in Ireland from being a burden to their parents or country, and for making them beneficial to the public. 1729.

24. *Gentleman's Mag.* Lond. 1736, p. 729.

25. BROWNLOW, J. Memoranda; or Chronicles of the Foundling Hospital. 1858 Ed. p. 12.

26. KAIMES. Sketches of the History of Man. Ed. 2. Edinb., 1778, Vol. 3, p. 87.

27. Reprinted in BUCHAN, W. Advice to Mothers. Ed. 2. Lond., Cadell and Davis, 1811, p. 377 et seq.

See also REECE, R. Medical Guide. Phila., Hopkins, 1808, p. 118 et seq.

French Trans. in HUXHAM, J., Essai sur les différentes espèces de fièvres. Essai sur la manière de nourrir et d'élever les enfans, depuis leur naissance jusqu'a l'âge de 3 ans. Paris, 1752.

German Trans. by Fr. Warnecke. Münster, 1782.

28. FOSTER. Alumni Oxoniensis. Lond., 1888.

29. *Medical Register*, Lond., 1779.

30. BROWNLOW, J., *Ibid.*, 1847, p. 19.

31. CADOGAN, W. Dissertation on the Gout. Lond., 1771.

32. FERET, C. J. Fulham, Old and New. Lond., 1900, p. 290, vol. I.

FAULKNER, T. Historical and Topographical Account of Fulham. Lond., 1813.

LYSONS, D. Environs of London. Lond., 1795.

33. Sermons to the Rich and Studious, on Temperance and Exercise; with a Dedication to Dr. Cadogan. By a Physician. Lond., Dilly, 1772.

34. Loungers Common-Place Book. Ed. 3. 1805, p. 196, vol. I.

35. Unpublished Correspondence of David Garrick. Ed. by George P. Baker. Boston, 1907.

36. ROBERTS, W. Memoirs of the Life and Correspondence of Mrs. Hannah More. N. Y., Harper, 1834, p., 90 vol. I.

37. Paston, G. Social Caricature in the Eighteenth Century. Lond., Methuen, 1905, p. 124.
38. Hanway, J. Serious Considerations on the salutary Design of the Act of Parliament, for a regular uniform Register of the Parish Poor . . . Lond., 1762, p. 10.
39. Hanway, J. Letters on the Importance of preserving the rising Generation of the labouring Part of our Fellow Subjects; being an Account of the Miserable State of the Infant Parish Poor . . . Lond., Millar, 1767, p. 6, vol. I.
40. Malcolm, J. P. Anecdotes of the Manners and Customs of London during the Eighteenth Century. Lond., 1808, p. 44.
41. Merriman, S. In: Treatise of the Diseases of Children, by Michael Underwood. Lond., 1827, p. 3.
42. Watson, J. B. Psychological Care of Infant and Child. N. Y., Norton, 1928.
43. *Gentleman's Mag.*, Lond., 1777, pp. 416, 633.
44. Foote, J. *Am. J. Dis. Child.*, May, 1918.
45. Foote, J. *Ann. Med. Hist.*, 2: No. 3, p. 213, 1919.
46. Annual Register. Lond., 1798, p. 400.
47. Hamilton, A. Management of Female Complaints. Edit. 9, Edinburgh, 1824, p. 252.
48. Place, F. Autobiography. Quoted from George, "London Life in the xviiith Century."
49. Examination of Dr. Price's Essay on Population, by the Rev. John Howlett, a.b. Quoted from Hamilton's "Family Female Physician," Worcester, Thomas, 1793, p. 270.
50. Garrison, F. H. (quoting Edmonds) Abt's Pediatrics. Phila., Saunders, p. 152, vol. I.
51. Holt, L. E. Infant Mortality, Ancient and Modern; An Historical Sketch. Am. Assoc. for Study and Prevention of Infant Mortality. 4th Annual Meeting, 1913.

General Reading

Brownlow, J. Memoranda; or Chronicles of the Foundling Hospital. Lond., Low, 1847.

History and Design of the Foundling Hospital. Lond., Warr., 1858.

Gentleman's Magazine, see Historical Chronicles, 1737–1760.

George, M. D. London Life in the xviiith Century. Lond., Kegan Paul, 1925.

Hanway, J. Candid Historical Account of the Hospital. Lond., 1759.

Munk, W. Roll of the Royal College of Physicians. Lond., 1878.

Payne, G. H. The Child in Human Progress. N. Y., Putnam, 1916. This book, culminating in the dramatic episodes connected with the establishment of a seventeenth century foundling hospital in Paris by St. Vincent de Paul, is of inestimable value to anyone interested in the treatment of infants and foundlings throughout the ages. The story of this man, one of the greatest benefactors of infants for all time, and of his endeavors, is strikingly similar to the story of Thomas Coram and the Foundling in London a century later. The effect of the London institution, however, was more universal, more permanent and resulted in a decided fall in infant mortality.

Pugh, J. Remarkable Occurrences in the Life of Jonas Hanway. Lond., Davis, 1787. Contains a full bibliography of Hanway's works.

Ruhräh, J. William Cadogan, his Essay on Gout. N. Y., Hoeber, 1925. Pediatrics of the Past. N. Y., Hoeber, 1925, p. 382.

THE PHYSICIAN OF THE DANCE OF DEATH*

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PART III

HOLBEIN. THE GREAT DANCE OF DEATH OF THE RENAISSANCE

THE name of Holbein is inseparably linked with the Dance of Death. The small woodcuts of his cycle of the "Imagines Mortis," the title under which many of the early editions appeared, constitute one of the greatest masterpieces of pictorial art the world has ever seen. The impression made by them upon the modern human mind viewing them for the first time is as vivid and deep as that made when these little xylographic sheets were first given out in the early part of the sixteenth century. They have a dramatic Shakespearean force and quality. As in the case of all other masterpieces of art of the highest order, their vitality of interest is eternal because they are pictures of life even more than of death. They are full of the deepest human interest. In each of these little cuts the story of a man's life, his calling, fate, and end, is told with tragic force and truth. For centuries they have delighted and charmed lovers of art throughout the world; and to many the phrase, Dance of Death, suggests Holbein only. In Germany the Holbein woodcuts are known as "Der grosse Totentanz"; and German appreciation of their artistic value is expressed in such critical judgments as this: "In diesen kleinen Blättern eine Welt von Gedanken und Beziehungen mit höchster Meisterschaft zusammengefasst ist."

For Holbein the subject of the Dance of Death must have had an especial intriguing interest, for he produced three separate masterpieces dealing with it. These three, the Dagger Sheath with the Dance of Death, The Alphabet of the Dance of Death, and the great Imagines Mortis, we are sure are his creations. In addition to these are the legendary paintings of a dance of death on a house in Basel and a painting on the same subject in the palace at Whitehall in London. The evidence concerning these two reputed works is very slender indeed and rests largely upon inferences derived from rather vague contemporary literary mention. It must be remembered here that for a long time Holbein's relation to the great Dance of Death was uncertain; it was not definitely known whether he was the artist who drew the designs, or whether he cut the blocks himself; and it was even denied by some writers that he had any connection with it. The fact that the first edition of the woodcuts in book form was made in Lyons was used as an argument against Holbein's authorship. Further, a curious error arose in regard to the Dance of Death at Basel. Holbein at a certain period came to be regarded as the artist who painted the wall paintings in that city, and this is repeatedly stated as a fact in the literature of the early part of the nineteenth century. To increase this confusion, some of the artists who brought out editions of reproductions of the Basel Dance of Death mixed Holbein's designs with those derived from Büchel's copies of the Basel paintings, producing a curious hybrid of the two art works. All of these confusing errors have been cleared up by the critical researches made during the latter half of the last century, and Holbein's position as the Master of the Dance of Death of the Renaissance has been established for all time.

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* Part I appeared in the July issue of the ANNALS OF MEDICAL HISTORY, p. 351; Part II in the September issue, p. 453.

The drawings for the Dance of Death for the dagger sheath are the earliest effort of Holbein in dealing with this subject, and must have been made before 1521, since the design was executed on the sheath for a dagger which was engraved by Urs Graf in that year. Two examples of the hand-drawn design have been preserved, one in Berlin and the other in Basel. Opinions differ as to which is the original drawing and which the copy. Certain anatomical differences in the two led Goette to the conclusion that the Berlin example is the original Holbein drawing, and that the example in Basel is only a copy. Six persons only, King, Queen, Soldier, Maid, Monk, and Child, are represented in this design, each with a companion Death, those attending the Queen and Maid being of the female sex. While no one of the figures is taken outright from the Basel Totentanz, it is clear that Holbein derived his inspiration wholly from the Basel pictures; there is no evidence of any other influencing factor. Some of the figures, as that of the King, have a certain composite character, showing characteristics belonging to several figures in the Basel paintings. The deaths are represented in skeleton form. The twelve figures are arranged in separate pairs; both the living and the dead show active and passionate movement. The design is extraordinarily adapted to its purpose as a decoration for a dagger sheath. It gives the impression of a perfectly balanced and rhythmical unit. Holbein's art lies here in his wonderful adaptation of the Totentanz motive for purely decorative purposes. In this composition he retained more of the style and spirit of the old Dance of Death than he did in his Alphabet and in the Imagines Mortis.

The Alphabet with the Totentanz scenes was also primarily decorative in aim. It was intended as a collection of initial letters to be used in book printing. Twenty-four letters of the alphabet were designed, each with a dance of death scene, enclosed within quadratic borders, and were cut in wood. The designs were most probably drawn by Holbein directly upon the wood blocks, and were cut by Lützelburger. They first appeared in print in 1524, and were, therefore, probably drawn in 1523. Holbein's inspiration for the dance of death scenes connected with each letter is chiefly drawn from the Basel Totentanz; but they also contain evidences of other sources, as the Heidelberg woodcuts, the Danse Macabre, the Heures, and the wall paintings of Manuel in Berne. The scene in the letter A is taken bodily from the Basel Totentanz; it represents the charnel-house scene at the beginning of that painting. The Cardinal (E) in costume and position suggests that of the Basel dance, the Nun (Q) that of the Heidelberg woodcuts, and the Physician (M) that of the Danse Macabre and of the Hours. The majority of the individuals represented in the Alphabet correspond with those in the Basel Totentanz. In the letter S the second death bears an hourglass upon his back after the manner of the death in the scene with the Artist in Manuel's painting in Berne. Further, the position of the death in the scene of the Physician (M), standing behind the latter, is suggestive of the similar position in Manuel's painting. It is of interest to note that Holbein made use also of earlier drawings of his own for the Alphabet. The monk in the letter O is undoubtedly copied from the Dagger Sheath; and the horse in the letter V is a copy of that in his rider of the Apocalypse.

In spite of these numerous reminiscences and free borrowings from other sources, the dance of death scenes of the Alphabet are for the greater part worked out in an original manner as far as the general situation and dramatic significance are concerned. It would seem that Holbein started to reproduce the Basel paintings, but was quickly led by his own artistic instinct to the development of dramatic scenes taken from real life. In this development he abandoned the traditional conventions of the old Totentänze and produced a work in which the interest of human life and experiences often over-balances the interest of the rôle played by death in the depicted incident. Satire and humor are freely used, but Holbein knew how to individualize and bring home to his audience the general abstract idea, and to give it a manifold personal application. In the old Totentänze such conceptions were confined almost wholly to the text, and did not reveal themselves in the pictures. In the Alphabet, Holbein stands in an intermediate position between the beautiful decorative adaptation of the old Totentanz motive of the Dagger Sheath and his wonderful artistic creation of the Imagines Mortis, in that each picture becomes a completely rounded representation of contemporary life, which the presence of the figures of death serves only to accentuate. Some of these pictures undoubtedly possess a special significance, satirical or political. In the scene in letter K with the figure of the Count, the death figure is dressed in a peasant's costume and through his threatening manner brings to mind the contemporary peasant war in which often enough the lower classes decided the life or death of their rulers.

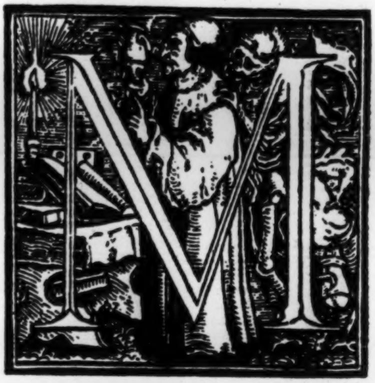


FIG. 22. THE LETTER M WITH THE PHYSICIAN. FROM HOLBEIN'S ALPHABETUM MORTIS. REPRODUCED BY LÖDEL. EDITION PRINTED BY H. LEMPERTZ, COLOGNE, 1849. ENLARGED.

The twelfth letter, M, shows us the physician (see Fig. 22). Some writers have taken it for granted that the letter is the initial for the Latin name of the personage represented, M for medicus, and although this supposition fits this individual case, it is not generally applicable to the Alphabet without recourse to the most far-fetched assumptions. The physician stands before his study table, on which there is a lighted candle and an open book. He is dressed in the costume of the Danse Macabre. In his right hand he holds the urine flask which the figure of death, standing behind him, is reaching to him over his right shoulder. He is examining the urine against the light of the candle. The death has his left hand upon the physician's left shoulder. At the side of the death, half concealed by the descending limb of the letter M can be made out portions of the body of a little devil who is urinating into another urine flask. Thus the satire is doubly sharp and bitter. Not only is the helplessness of the physician to avert his own death indicated, but his pretense of knowledge is mercilessly exposed in a manner so coarse as to add insult. In the great Imagines Mortis this representation of the Physician is replaced by a conception more human and realistic, but with as deeply biting satire, which is the more effective because of its realism.

In its presentation of dramatic scenes from real life the Alphabet made a great advance over the design for the Dagger Sheath, but the small woodcuts of the former do not possess the elegance of style shown in the hand-drawing. The technic of the wood cutting, however, has always been a source of wonder to artists and engravers. In the fineness and delicacy of the lines many have found reason to believe that the drawings were executed on copper plates and not upon wood blocks. The most competent authorities agree, however, that they are woodcuts, and that Hans Lützelburger, "the prince of woodcutters," cut the blocks. Differences in imprints once thought to indicate differences in plate or block are now believed to be due to different degrees of pressure used in printing. Only two complete copies of the Alphabet printed on single sheets exist, and these are in the library at Basel and in the print collection in Dresden. Single prints of these initial letters occur in numerous works printed in Basel by Hervagius, Frobenius, Bebelius, Cratander, Isingrin, and other printers, also in the Strassburg Greek Bible of 1526, in Cratander's Greek Galen of 1538, and in other works. Proofs of portions of the Alphabet are to be found in numerous collections. Modern reproductions have been published by Dietrich (1849), Lempertz (1849), Tross (1856), Trübner (1897), and Weicher (1911).

The Great Dance of Death. Proofs of some of the blocks of Holbein's Totentanz are known to have been made in 1527. In 1530 an edition of forty woodcuts, printed only on one side of the sheet with German text above and below the cuts, was issued in Basel. The edition was anonymous; neither the date nor place of printing was given. According to Massmann there are very good reasons for ascribing to it the date of 1530; and this is generally considered the first edition; although some writers regard the earlier issue of proofs as constituting a first edition. It is very probable that there were several of these proof editions issued, varying in the number of cuts. In 1538 the brothers Melchior and Gaspar Trechsel in Lyons brought out an edition in French with forty-one cuts, that of the astrologer having been added. This work, also anonymous, bore the title of "Les Simulachres et Historiees faces de la Mort." Over each cut was a Latin text taken from the Bible and appropriate to the subject. Beneath each picture were four verses in French doggerel verse explaining the subject. Art critics and connoisseurs have been almost unanimous in attributing these anonymous pictures of death to Hans Holbein (1498–1554), and they are today accepted universally as his creation. In spite of the arguments to the contrary advanced by the Englishman, Douce, in his critical study of the Dance of Death in 1833, the researches of Rumohr, Massmann, Kastner, Wacknernagel, Woltmann, and Goette, have proved conclusively Holbein's authorship of the cuts of the greater Dance of Death, as well as of the design for the Dagger Sheath and the Alphabet. For at least twelve years before the publication of the Lyons edition, proofs of the Holbein pictures were issued in Basel with German inscriptions, and according to Holbein's contemporary, Amerbach, with the titles "Totentanz" and "Chorea Mortis." The question, which has led to much fruitless discussion as to whether Holbein simply drew the designs upon paper or upon the woodblocks themselves and then turned them over to a professional "Formschneider" to be cut, or whether he cut some of the blocks himself, is a matter of very subordinate interest and can probably never be settled. It is certain that some, if not the majority, of the blocks were cut by Hans Lützelburger, who went to Basel in 1522 and died in 1526, leaving some of the blocks uncut. It is not known who cut the remaining ones, or in what way the whole set was taken to Lyons. Among the designs which were cut later for the 1545 editions were four, the Soldier, Gambler, Drunkard, and Fool, which had formed part of the material of the Alphabet. It is probable that the blocks, which were cut in Basel under the inspiration of the Basel Totentanz, after their first use in the German edition, became the property of some creditor, who carried them into France to be used there, at the discretion of the new owner, for the illustration of one of the then popular religious books, with explanatory verses accompanying each picture. Very much in the same way were the pictures of the Danse Macabre utilized for the adornment of the Books of Hours. That such a use of the Holbein cuts was actually made is shown by the inclusion in the Lyons edition of the pictures of death of 1545, of Holbein's groups of children, which had no connection with his dance of death pictures, but were used with Bible verses attached, characterizing them as a representation of the different vices.

That the Holbein Totentanz had a contemporary fame is shown by the poetic glorification of it by the Latin poet Nikolaus Borbonius in the following verses:

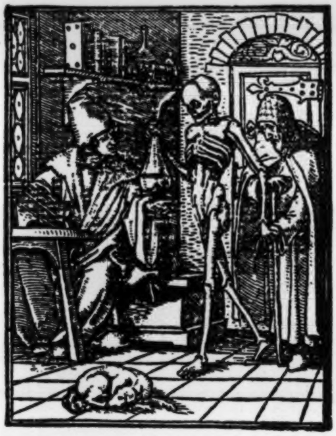
DE MORTE PICTA A HANSO PICTORE NOBILI

Dum mortis Hansus pictor imaginem exprimit,
Tanta arte mortem rettulit, ut mors vivere
Videatur ipsa: et ipse se immortalibus
Parem dis fecerit, operis hujus gloria.

That its fame extended into the next generation is shown by the story told by Sandrart, that in his youth he made a journey to Amsterdam and paid a visit to the celebrated Paul Rubens, who in conversing with him advised him strongly to study and to copy Holbein's pictures of death, as he had himself done in his youth. The early German proof editions have practically disappeared; only a few incomplete sets remain. This was probably due to the perishable nature of the prints; it was not until the first book edition of 1538 that the more durable form made the possibilities of preservation greater, so that our definite knowledge of the Holbein Totentanz really begins with the first Lyons anonymous edition. The title-page of this edition bears the following: "Les Simulachres and Historiees Faces de la Mort, autant elegammet pour-traictes, que artificiellement imaginées. A Lyon, Soubz l'escu de Cologne, M.D. XXXVIII," with the Trechsel device and motto. It is a small quarto, with 104 unnumbered pages. It is dedicated to Jeanne du Touszelle, Abbess of the Convent of Saint Pierre in Lyons. Pages 3 to 8 are taken up by "Epistre des Faces des Morts"; 9 to 15 by "Diverses Tables de la Mort"; 16 to 56 by the 41 plates; 57 to 72 by "Figures de la Mort moralement descriptes"; 73 to 85 by "Les diverses Mors des bons et des mauluais"; 84 to 93 by Memorables Authoritez"; 94 to 107 by "De la Necessitie de la Mort, etc." The colophon is: "Excudebant Lvgdvni Melchior et Gaspar Trechsel fratres, 1538." The moral quatrains accompanying the pictures were composed by the Paris printer Gilles Corrozet. The order of the 41 plates is as follows: 1, Creation of Eve; 2, The Temptation; 3, Expulsion from Paradise; 4, Adam Tilling the Earth; 5, The Charnel House; 6, Pope; 7, Emperor; 8, King; 9, Cardinal; 10, Empress; 11, Queen; 12, Bishop; 13, Duke; 14, Abbott; 15, Abbess; 16, Nobleman; 17, Canon; 18, Judge; 19, Advocate; 20, Senator; 21, Preacher; 22, Priest; 23, Monk; 24, Nun; 25, Old Woman; 26, Physician; 27, Astrologer; 28, Rich Man; 29, Merchant; 30, Seaman; 31, Knight; 32, Count; 33, Old Man; 34, Countess; 35, Lady; 36, Duchess; 37, Peddler; 38, Ploughman; 39, Child; 40, The Last Judgment; 41, Arms of Death. On the bedpost in the cut of the Duchess, 36, is the monogram HL, which is generally believed to indicate Hans Lützelburger, the cutter of the majority of the blocks. Sixteen editions were printed from the original blocks between 1542 (see Fig. 23) and 1574; one French and four Latin editions by Johann and Franz Frellon of Lyons

Medice, cura te-
ipſum.

LVCAE IIII.



Tu congnoys bien la maladie
Pour le patient ſecourir,
Et ſi ne ſcais teſte eſtourdie,
Le mal dont tu deburas mourir.

Fig. 23. Death and the Physician. From Les Simulachres et Historiees Faces de la Mort. J. and F. Frellon, Lyons, 1542. (After the Original in the British Museum.) Lützelburger's Original Wood Blocks after Holbein's Designs Were Used for This Edition. It Had 41 Plates. To the Plates Are Added, as in the First Edition, the Latin Quotations from Scripture and the French Quatrains of Corrozet.

(1542–1547); and four Latin, three French, and two Italian editions by Johann Frellon alone (1547–1574). In the Frellon editions of 1545, 1547, 1549, and 1554, there were 53 plates; after 1562 there were 58 plates. In those with 53 plates 1 to 39 are the same as in the first edition. The additional plates are: 40, Soldier; 41, Gambler; 42, Drunkard; 43, Idiot; 44, Robber; 45, Blind Man; 46, The Wagoner; 47, The Beggar; and 48 to 51, groups of children; followed by 52, The Last Judgment; and 53, Arms of Death. In the editions with 58 plates 1 to 44 are the same as 1 to 44 of the editions with 53 plates, the added plates being 46, Young Husband; 47, Young Wife; and 45, 48, and 58, being groups of children; while 49 to 57 are the same as 45 to 53. The plates of the children are not dance of death pictures; the final number of cuts belonging to the Totentanz proper is 51. Some of the copies of the 1545 Latin edition show a crack in the first plate, running from top to bottom, and this cracked block was used in the succeeding editions. It is probable that the accident to the block happened while this edition was in the press and that a portion of it was printed before the block was cracked. In the Latin edition of 1542 the French verses of the two French editions are translated into Latin tetrastichs by Georg Aemylius, a clergyman of repute and the brother-in-law of Luther. The Bible verses were also translated into Latin. These various editions were published under the titles of "Les Simulachres de la Mort," "Imagines de Morte," "Imagines Mortis," "Les Images de la Mort," and "Icones Mortis."

Innumerable editions, copies, and imitations, as well as facsimile reproductions of the Holbein Totentanz have been published. More than one hundred editions in 300 years are known to have appeared. It is necessary to make a distinction between the copies and the facsimiles. Of the latter, the most important are those by Lippmann (1879), Hirth (1884), Schlotthauer (1832), Douce (1833) and the English Holbein Society (1869). The Lippmann facsimile was made from the set of proofs in Berlin with 40 plates; Hirth's from the first Lyons edition of 1538 with 41 pictures; the Schlotthauer lithographic reproduction from an original edition not specified, containing 53 plates with 49 Totentanz pictures, corresponding to the fifth Lyons edition of 1545. It is necessary also to distinguish between copies of Holbein made either on wood or copper and those imitations of his design in which the artist used his discretion in varying them at his own pleasure, giving more or less free rein to his own imagination. Some of the latter borrow nothing from Holbein, except the general idea of the Totentanz, and work out the individual plates in a wholly different and original manner, adding or substituting new subjects. These imitators of Holbein will be discussed in Part IV. As to the copies in which a more or less faithful attempt was made to follow Holbein's designs accurately, very few are successful in preserving the charm of the original. In many of these editions the plates are reversed, and in others they are enlarged; and a careful comparison of the copies and the originals will show certain minor alterations in the former. The best of these copies is undoubtedly that made by an unknown wood engraver for the edition published by Vincenzo Vaugris, Venice, 1545 (see Fig. 24). This contains 41 beautiful plates, so skillfully done that the publisher claimed that they were superior to the originals. They are, however, slightly larger than these. On the other hand the numerous editions brought out in Cologne by Arnold Birckman (1543–1574) are very inferior to the originals, and do not compare with the Vaugris editions. Unfortunately copies come fairly frequently into the market at prices higher than their intrinsic value. In the early years of the 17th century, copies on copper plates appeared, and during the 17th and 18th centuries this was a favorite medium for their reproduction. The great majority of these copies, however, belong to the imitations rather than faithful copies, and will be described later. Only a few lithographic copies have been essayed. In Langlois' "Essai Historique sur les Danses de Morts," 1852, there are eight plates reproduced, claimed by the author to be printed from the original wood blocks used in the Lyons edition in French of 1547 (see Fig. 25). These are the

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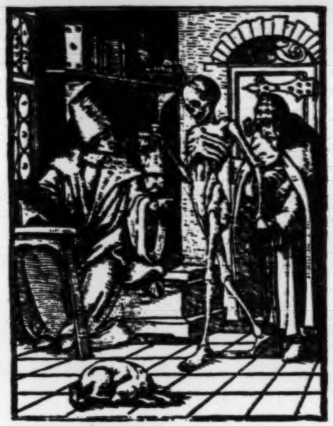
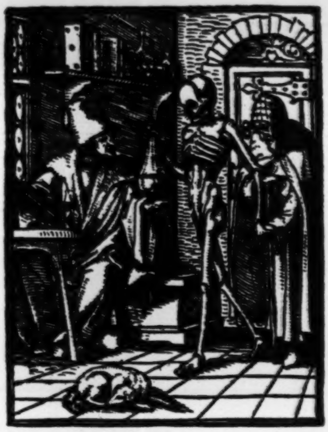


Cura te ſteſſo medico, ſe ſai.
Che penſi altrui cauar de le mie mani;
E più infelici, che contenti fai:
Ma'i ſon per fare i tuoi diſegni uani.

Fig. 24. Death and the Physician. From Simol achri, Historie e Figure de la Morte. V. Vaugris, Venice, 1545. (After the Original in the British Museum.) The Woodcuts for this Italian Edition Were Made by an Unknown Artist. It is the Most Beautiful of All the Reproductions of Holbein. The Publisher Boasted That They Excelled the Original. Vaugris Was a French Printer Established at Venice, and Seems to Indicate That He Had Frequent Relations with Basel.

Medecin, guery toy
toymeſme.

LVC IIII.



Tu cognois bien la maladie
Pour le patient ſecourir,
Et ſi ne ſçais teſte eſtourdie,
Le mal dont tu deuras mourir.

Fig. 25. Death and the Physician. From Holbein's Les Images de la Mort. J. Frellon, Lyons, 1547. (After the Original in the British Museum.) This Edition Had 53 Plates. Original Wood Blocks Were Used (41) with Twelve New Ones Added.

plates of the Pope, Empress, Judge, Physician, Astrologer, Seaman, Duchess, and Soldier. They show evidence of wear; in those of the Judge and Seaman the fillet of the border has disappeared in part. It is remarkable that these blocks should stand their prolonged use so well; it has been estimated that over 100,000 impressions had been made from them. Goette confirms Langlois' statement that these eight plates are printed from the original wood blocks; and says further that recent investigations in France gave no evidence as to their present whereabouts.

A comparative study of the Alphabet with the Totentanz and the Great Dance of Death shows conclusively that the latter represents the complete and fully ripened working-out of the idea in Holbein's mind, to which the conception of the Dagger Sheath and the Alphabet were but preparatory stages in the evolution of the Great Dance of Death. The relationship of the Alphabet to the Totentanz is very close. The latter is but a more finished and complete working-out of the ideas that gradually developed in Holbein's mind while engaged on the Alphabet, in the execution of which he found that the material hampered the complete expression of his ideas. He chose, therefore, the series of small pictures as the medium for the fuller exposition of his conceptions of the Totentanz motive. In the creation of these designs his art had ripened and his technical skill increased. The final result was the creation of a great masterpiece, the most perfect and complete expression of the Totentanz idea the world has seen. Out of the old dance of death material he created new forms and new situations, and brought them into the realm of true art. Some writers have urged the inappropriateness of the designation of the Dance of Death for Holbein's pictures, preferring the appellation of Pictures of Death. That the Holbein pictures differ in many details from those of the old Totentänze is very evident, but the essential motive of the old wall paintings and woodcuts is still the central idea of Holbein's work. But he has approached it in the spirit of a new age. Holbein stood at the height of the narrow pass between the old and the new epochs, the Gothic and the Renaissance. The idea of the freedom of man was replacing the old mystic-catholic conception of sinful man's relation to the universe. In place of the world of abstract ideas of the Middle Ages the concrete facts of earthly existence now asserted themselves. Self-consciousness became the ruling principle. Man's soul looked earthwards and not to the heavens; in place of mystic or demonic ruling influences, he accepts only moral and esthetic laws created by his own intellect. And these revolutionary changes in man's outlook upon the universe were reflected naturally in the art of the times. The artist no more sought to express the spiritual aspects of things, but turned to the actual world for his subject matter. Foreign to Holbein is the pathos of faith and belief; he is free from all sentimentality and lyricism; he is confused by no system of ethics. He presents only that which he sees, the comedy of human life in the early sixteenth century. As in the old Totentänze his pictures are arranged in a definite cycle, although each picture is a world in itself. His sharp, bold line is the medium of expression, and through it the movement of the figures, the sense of the action, and the special features of the environment are dramatically portrayed. In each scene he has seized the critical moment, the high point of the situation. Death, no mere symbolic representation, but a dramatic active personage, snatches away the human individual in that moment which reveals the specific characteristic of his life. It is not so much the creation of new material in which Holbein excelled, as in the artistic and intellectual reworking of the old. There is a progressive evolution from the wall paintings, block books, and woodcuts, to the artistic culmination of the Totentanz idea in the Holbein cycle. In this the art of the Dance of Death reached its highest level. Holbein undoubtedly was inspired by the Basel Totentanz, which he may have seen almost daily; that he was familiar with other representations of the motive is evident enough from the suggestions of these found in his work. But from all of these he received only an external inspiration. For its cyclical form, its individual pairs of death and the living, for the dancing of death, the introduction of musical instruments, and for other things he is indebted to the old forms of the Totentänze. But for the intellectual, or psychologic effect of his working-out of the idea Holbein departed widely from the old forms. The memento mori impression, which was the chief artistic aim in the old pictures is here subordinated to the impression of active dramatic life. These are pictures of life rather than of death. He shows us no representation of the actual death scene; his demonic forms of death serve only to illuminate and to heighten the energy of life. At the first glance his pictures may seem to be simple depictions of death scenes; but a moment's contemplation convinces us that their chief interest lies in their dramatic expression of life, and not in the horror or the inevitableness of death.

Like his contemporary, Manuel of Berne, Holbein shows the influence of the Reformation in his pictures, but he expresses his satire much less violently than did the former. In the plate of the Pope, one of the most satirical of them all, are two little devils; one introduced into the upper part of the picture is holding back the drapery of the dais, and the other is bearing an indulgence with the papal seals. In some of the later editions these two devils have been removed from the picture. At one time apparently the Holbein pictures were prohibited as offensive to Rome. Many writers have professed to see in the Pope a likeness to Leon x, in the Emperor to Maximilian, and in the King to Francis I. Others see a portrait of Holbein himself in the young man seated on the bed and playing a musical instrument in the plate of the Nun. Further, the two figures in the Arms of Death, as supporters, are said to represent Holbein and his wife. Much discussion has been carried on regarding Holbein's knowledge of anatomy in the depiction of his death figures; by some they have been criticized as not representing true skeletons. That Holbein had an accurate knowledge of the anatomy of the human body is evident from his rendering of the best pre-Vesalian skeleton in his Totentanz of the Dagger Sheath. But a skeleton has limitations as far as the depiction of movement and expression is concerned; Holbein wished to give his figures of death a share in the human activities which he depicted, and to give them facial expression. He, therefore, abandoned the skeleton form for one frequently with hair on the head and clothed in muscles and soft parts, that would give the impression of a living relief contour, yet in such a manner that these soft parts suggest a dead body. Nevertheless, a close study of the head, trunk, extremities, and pelvis of his death forms shows an accurate knowledge of anatomical details not surpassed in any of Holbein's contemporaries (see Fig. 26). Holbein's forms of death are not representations of the dead, as in the old Totentänze, nor are they a personification of death; they represent phantastic imaginary demonic beings, having attributes of life, and play a rôle corresponding to this in the individual pictures. In order to heighten this impression he not infrequently introduced figures of devils alongside with his death figures, both in the Alphabet and in the great Dance of Death. Holbein's deaths perform a wholly different function from those of the older Totentanz pictures. They appear upon the scene, not as guides for departing souls to the land beyond, but as active malicious and malevolent spirits, leering and capering in glee over the sad joke they are about to perpetrate upon the unfortunate victim. It has been said that Holbein's cycle is not a true Dance of Death. As a matter of fact, a study of the

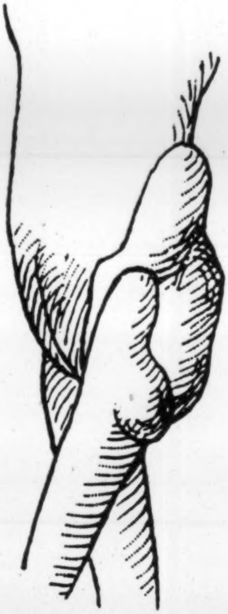
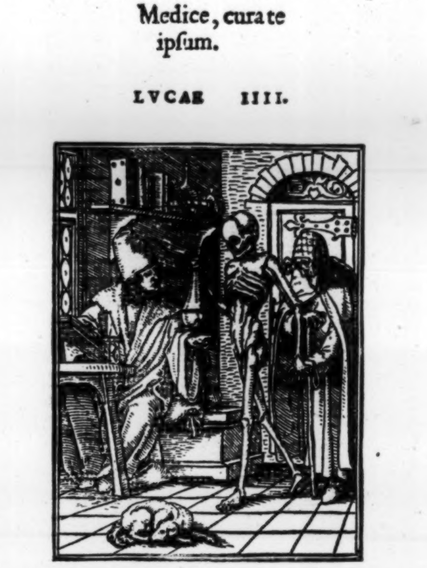


FIG. 26. PELVIC REGION OF THE DEATH FROM THE PHYSICIAN OF HOLBEIN'S IMAGINES MORTIS. MUCH ENLARGED. COMPARISON OF THIS WITH ACCURATE ANATOMICAL REPRESENTATIONS SHOWS THAT IT IS ONLY A REPRODUCTION OF THE MUCH SHRUNKEN NORMAL PLASTIC ANATOMY. THE NORMAL LANDMARKS ARE CORRECTLY INDICATED.



Medice, cura te ipſum.

LVCAE IIII.

Tu bene cognoſcis morbos, artemq́; medēdi,
Qua ſimul ægrotis ſubueniatur, habes.
Sed caput ô ſtupidū, cū fata aliena retardes,
Ignoras morbi, quo moriere, genus.

FIG. 27. DEATH AND THE PHYSICIAN. FROM HOLBEIN'S IMAGINES MORTIS. J. FRELLON, LYONS, 1547. (AFTER THE ORIGINAL IN THE BRITISH MUSEUM.) THIS EDITION HAD 53 PLATES, INCLUDING THE 41 ORIGINAL BLOCKS, TO WHICH 12 NEW FIGURES WERE ADDED. LATIN TRANSLATIONS OF THE FRENCH EPIGRAMS MADE BY GEORG AEMYLIUS, BROTHER-IN-LAW OF LUTHER.

pictures will show almost as much dancing on the part of the death figures as in the old Basel pictures.

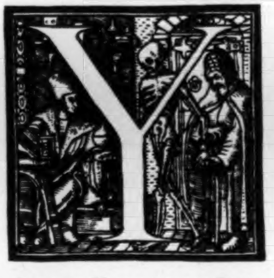


Fig. 28. Letter Y with the Death and the Physician from Holbein's Imagines Mortis. From the Libro en el Qual Hay Muchas Suertes de Letras· Historiadas . . . Ytambie un Abecedario con Figuras et la Muerte. By J. de Yciar, 1555. (After the Original in the British Museum.)

The charm of Holbein's pictures is so great that one is tempted to consider them in detail, one by one. They have served as a rich mine for adaptation to use as bookplates. And of all of the series no one plate has been more frequently drawn upon to fulfill this function than the well-known one of the Physician (see Fig. 27). The scene is that of an office or study. At the left before a window with oval bull's eye panes sits the physician on a heavy wooden chest. He is at his study table on which rests an open book with an hourglass at its side. The floor is apparently of square tiles, and in the immediate left foreground lies a dog asleep. This introduction of the animal companion is significant in itself of the character of the physician. He has become more human. He must have a kind heart or he would not have a pet. This tactful human touch is one of Holbein's greatest gifts; into every one of the pictures of his cycle little incidents or objects are introduced that have a deep significance for the interpretation of the personages represented in the scene. High on the wall, behind the physician, is a shelf filled with blocks and flasks, indicating his professional armamentarium. The physician himself is attired in the long ungirdled robe of the period. It has a wide fur collar and voluminous sleeves. On his head is the tall rounded cap. His hair is abundant and long and somewhat curly. He wears no beard. His face is thin and sharp, with a long straight nose and a thin but strong chin. It is not an attractive face, but may be described as intellectual in type. It is evident that Holbein presents the physician as a student. Nothing of the quack is here apparent. The whole atmosphere is that of a study, plainly furnished with the bare necessities, the physician intently engaged in consulting his Galen or Hippocrates, while his dog sleeps happily upon the floor. Into this quiet retreat, disturbing the reader but not the dog, have come, through the round-arched door, which they have closed behind them, a strange pair. Death advances, holding the urine bottle before him, for inspection by the physician. Behind him he leads by the left hand a stooped and bent old man, who leans upon a long cane which he holds in his right hand. The old man wears a quilted hood and a long cloak buttoned by a single button at his neck, beneath which the usual gown appears. He has on soft shoes slightly pointed at the toes. His expression is that of a feeble old man, a perfect portrayal of advanced senility, weak, ill, and querulous. The transom over the door is decorated with an arabesque; on the door itself is a beautiful, simple strap-hinge, terminating in a fleur-de-lis. Holbein must have been very fond of this decorative motive for he employed it frequently in his pictures. The composition of the three figures reveals Holbein's great artistic sense. The death stands forward, between the sitting physician and the aged patient, binding the group into a perfect balanced unity. It is a consultation between death and the physician as to the fate of the patient. But the satire of this picture is double; it includes both the physician and the patient. Over the plate is the quotation from Luke IV: 23, "Physician, heal thyself." The physician has no power to avert death, either from himself or the old man. He knows what advice to give the patient, but he is ignorant of his own approaching end. A free rendering of Corrozet's explanatory quatrain beneath the plate seems to indicate that the death of the physician and not that of the old man is intended:

Well knowest thou the malady,
In order to succour the patient,
And yet knoweth not, addle-pate
The disease by which thou, thyself, are about to die.

The delineation of the death in this scene is most remarkable. The artist has succeeded in giving to his face and body though partly skeletonized a living expression of sly deprecation and mischievous humor. The physician with a serious inquiring face turns his head towards death and extends his left hand, with palm open to the pair. Simple as this gesture would appear, yet it has been interpreted differently by various writers. Some see in it simply a movement to receive the urine flask from the death; others have interpreted it as a gesture of dismissal to the old patient, an acknowledgement that nothing can be done for him. Against the first interpretation it may be argued that the most natural way to take the urine bottle would be by putting the hand around the long neck of the flask, instead of receiving it on the open palm. To the writer's mind the physician is but making a conventional gesture of receiving the patient and the consultant. The double-edged satire, aimed against both the physician and the patient, is heightened by the consultation scheme of the composition, in that the consultant himself is death. The impression made upon the beholder is infinitely greater than that which might be produced by viewing the actual death scene of either one of the principals in this drama. In his Physician of the Alphabet, Holbein represented not so much the powerlessness of the physician against death, as the futility and absurdity of his pretended knowledge of diagnosis. In doing this he broke away from the old convention of this scene. Much further did he depart from the old conception in this ingenious and charming genre-picture of the consultation with death. It is a more human picture, more intellectual and less coarse than the satire of the Alphabet. It has been and always will be one of the favorite plates of Holbein's cycle. A few writers have made the curious error of taking the patient in this scene for an old woman; and some of the imitators of Holbein have actually represented an unmistakable woman as the patient, as Rentz, for example. It may be that this change of sex was intentional, as an effort towards originality.

In Holbein's Physician a more pleasing conception of the character of the contemporary man of medicine is shown us in the emphasis laid upon two cardinal traits. In the first place he is a student, earnestly engaged in searching his authorities; in the second place, he shows humane qualities, reflected in the confidence reposed in him by his sleeping dog. It may be safely assumed that for him the urine examination is not the whole thing in diagnosis; it is only a preliminary step in the examination of the patient. The old pose has lost its significance of quackery. We have a kindly feeling for this student of medicine, whose studies have been so rudely interrupted by the messenger of death. Not only did Holbein express satire in this plate, but humanity as well, and the impression made upon the beholder is rather preponderantly in favor of the latter. In the Holbein cycle the art of the Totentanz motive reached the highest point of its development. Nothing has since approached it, either in inspirational value, human interest, or in skill of technic. From now on the art works dealing with this motive show a progressive decline until the period of the Great War, when individual creations show a new quality of realism in the depiction of the external horror of death under the conditions of modern warfare.

[From Schenckius: Observationum Medicarum, Francofurti, 1609.]

EDITORIALS

SAN FRANCISCO MEDICAL HISTORY SEMINARS

ON August 8, 1930, the San Francisco Medical History Seminar held a luncheon in honor of Doctor and Mrs. Charles S. Singer of London who had lectured in Berkeley and San Francisco during the summer to the great profit and delight of all who heard them. The subject for discussion was Hieronymus Fracastorius (1478–1553), and his "Syphilis sive Morbus Gallicus." This was appropriate not only because of thus celebrating the four hundredth anniversary (to the month) of the publication of this most famous medical poem, but also by virtue of Doctor and Mrs. Singer's interest in, and important study of Fracastor's significance (inaugurating these ANNALS, 1: 1, 1917).

The paper presented on this occasion had been written by Doctor Warren Stratman-Thomas, while a Guggenheim Traveling Fellow in Africa and Europe, 1928–1930. Doctor Stratman-Thomas unfortunately could not be present because of his duties in Mississippi under the auspices of the International Health Division of the Rockefeller Foundation. The outstanding feature of Doctor Stratman-Thomas's contribution was his account of a hitherto undescribed portrait of Fracastor, which may be of sufficient interest to your readers to give in abstract here.

Most of the representations of Fracastor seem to have been taken from the woodcut portrait in his "De Homocentricis" (Verona, 1538), which is supposed to be the only authentic likeness made during his life. Doctor Stratman-Thomas found, however, a portrait (No. 3949) in the National Gallery, London, which is said to be of Fracastor. This portrait is attributed to Francesco Torbido (1486–1545) who was born in Verona and who was a pupil of the famous Giorgione at Venice. Torbido worked in Verona and certainly could have made a portrait of Fracastor during the

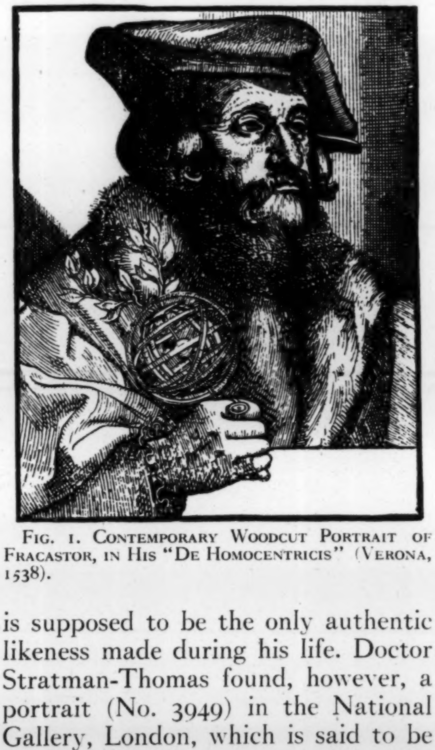


FIG. 1. CONTEMPORARY WOODCUT PORTRAIT OF FRACASTOR, IN HIS "DE HOMOCENTRICIS" (VERONA, 1538).

latter's life. The portrait is in oil, on canvas, $36\frac{3}{8}$ inches high and $28\frac{3}{4}$ inches wide. It is a half-length right profile with the head half right and the right hand and arm resting on a balustrade. There is a dark gray architectural background. The subject wears a black robe trimmed in gray fur, tawny in places, and a black cap and grey gloves. The hair and beard are dark brown. The picture was obtained from the Mond Bequest in 1924. While this picture portrays a slightly younger man than the subject of the woodcut, there is considerable similarity. The mole near the nose on the right face which shows in the woodcut, is lacking in this portrait, but it also seems to be lacking in the portrait bust by Cataneo, so entertainingly described by Klebs.[1] In the Pitti Gallery (Florence) portrait (reproduced in Cumston[2]) this mole appears on the left side of the face. The nose, hair, beard, and clothing of the Torbido portrait are very similar to these features in the woodcut. If the authenticity of the latter is allowed there does not seem to be much reason to doubt that the Torbido picture is also of Fracastor.

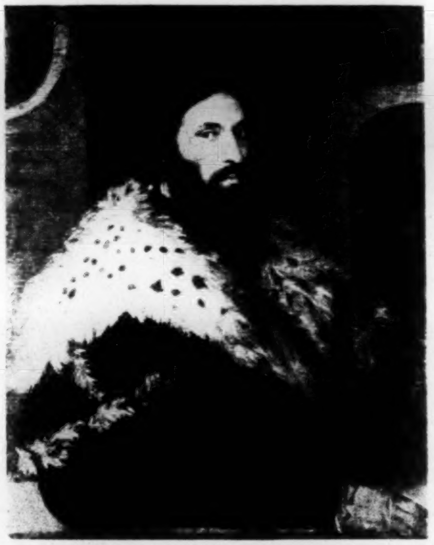


FIG. 2. PRESUMED PORTRAIT OF FRACASTOR (1478–1553) ATTRIBUTED TO FRANCESCO TORBIDO (1486–1545). (NATIONAL GALLERY, LONDON.)

Doctor Wilmer Cave Wright of Byrn Mawr, whose skillful translation and authoritative description of Fracastor's "De Contagione" (Venice, 1546) has just appeared in book form, writes me that this Torbido portrait has been listed for a long time by Doctor Klebs in his catalogue of Fracastor likenesses. The Torbido canvas and the 1538 woodcut are reproduced herewith for comparison by your readers.

CHAUNCEY D. LEAKE.

ON September 24, 1930, the San Francisco Medical History Seminar gave a luncheon in honor of Doctor William Henry Welch, beloved Professor of the History of Medicine at the Johns Hopkins University Medical School. The three hundredth anniversary of the recognition of the value of cinchona in the treatment of fevers was celebrated by becoming the subject for discussion under the direction of Prof. C. D. Leake. General remarks on the romantic story of cinchona were made by Dean Langley Porter, while Doctor William Dock critically and vividly described its first European use. Dean H. C. Biddle told of the isolation of the chief cinchona alkaloids, and Doctor K. F. Meyer gave an account of the discovery of the cause of malaria. Doctor C. A. Kofoid, who had returned from Japan a few hours before the luncheon, discussed the present cultivation and use of cinchona. Doctor Welch's remarks, as always, were so interesting and significant that I am requesting space to report them.

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[1] *Johns Hopkins Hosp. Bull.*, 26: 378, 1915.

[2] History of Medicine, London, 1927.

Doctor Welch ventured the opinion that the introduction of cinchona in the 17th century had a greater practical influence in overthrowing medieval Galenism and its traditional theories than the more academic work of Vesalius and Harvey. The efficacy of cinchona in curing intermittent fevers, as recognized in the fourth and fifth decades of the 17th century, and as popularized by its dramatic success in various notables a little later, focused medical attention not only upon "specifics" for various diseases but also upon the possibility of a "specific" cause for each ailment. This obvious practical attack on the ancient humoral pathology naturally aroused bitter opposition in academic medical circles, which was responsible for the acrimonious debate regarding the merits of the drug. Doctor Welch stated that while he had never seen this thesis defended, he felt sure sufficient evidence could be found to develop it fully.

In referring to the great discoveries regarding malaria, Doctor Welch emphasized the significance of Bancroft's phrase, "ripening time." Laveran's early studies were received without conviction by Weigert and Ehrlich, with whom Doctor Welch was studying in 1884 in Frobenius' pioneer bacteriological laboratory. It was the influence of Marchiafava and his pupil Celli which slowly convinced scientists of the truth. MacCallum's demonstration in Doctor Welch's laboratory of the sexual nature of the malarial parasite was thrillingly described. Doctor Welch also referred to obscurely published experiments demonstrating that the three types of malarial fevers reproduce specifically upon inoculation. Doctor Welch told how he named *Plasmodium falciparum*, the crescent producing organism responsible for estivo-autumnal malaria.* In concluding, Doctor Welch proposed that it would be most appropriate to send an account of the seminar with the greeting and best wishes of its members to Sir Ronald Ross. This was approved, with fervent acclaim not only for Sir Ronald but especially for Doctor Welch.

SANFORD V. LARKEY.

EDITORIAL NOTE

The Medical History Club of the University of Rochester held a meeting on Monday, November 24, 1930, at 8.15 in the amphitheater of the Medical School (Strong Memorial Hospital). Dr. Edward S. Adolph read a paper on Halos and Haller and Dr. George W. Corner interested the meeting with adventures of Elisha Kent Kane.

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* LOOMIS and THOMPSON. System of Practical Medicine. N. Y., 1897, 1: 36.

BOOK REVIEWS

Clio Medica. Internal Medicine. By Sir Humphry Rolleston, Bart., k.c.b., m.d. N. Y., Paul B. Hoeber, Inc., 1930.

The name of the author was ample guarantee that this volume would be well done and he has lived up to his name. To tell the story of the development of internal medicine in such a concentrated way; to describe the course of its evolution over a long period and yet keep the reader's interest throughout, is no easy task. In the sections on Hippocrates, Aristotle, Galen and Celsus, to cite a few examples, the essential facts of their lives and work are given in such a way that the student with any interest which can be stimulated must feel the desire to know more. The following of the streams of medical knowledge shows how some of them dried up and vanished, others became pools and made no progress, while others kept on sluggishly without much change for centuries. The consideration of various periods under different headings, as clinical medicine, neurology, etc., aids in keeping distinct many of the special advances. There is the mention of over 400 names of men who have done something worthy of being recorded in internal medicine, an instance of how widely the author has covered his subject. He has given full credit to the advances made by physicians in North America. This volume can be very heartily recommended as an excellent survey of the history of internal medicine. It should be read by every medical student and should do much to interest practitioners who may not have had previous interest in the subject, in the story of the development of their art. The editor of this series, Dr. E. B. Krumbhaar, is to be congratulated on the success of the volumes which have appeared. The wisdom of his choice of writers has been well demonstrated.

T. McCrae.

Medical History of Michigan. Vol. i. Compiled and Edited by a Committee, C. B. Burr, m.d., Chairman, and Published under the Auspices of the Michigan State Medical Society. Minneapolis, Bruce Pub. Co., 1930.

The increase of the interest in the medical history of this country, and the desire to render permanent the records of its beginnings before it is too late, is well shown in this large and handsome volume published under the auspices of the Medical Society of the State of Michigan. The work has been thoroughly and excellently carried out by the committee appointed for that purpose and it is evident that the knowledge and ability of its chairman, Dr. C. B. Burr, has had much to do with the success of the project. Although Michigan was a wild and sparsely settled country until well towards the end of the first half of the nineteenth century the communities which have since become its great cities were largely composed of men of ability and force of character and among them were a number of medical men who not only practiced their profession but also took an active part in public affairs. To these men we owe the foundation of medical schools like that of the University of Michigan and the high standing which the profession attained in Michigan at an early date and has successfully maintained to the present day.

Before the settlement of what is now the State of Michigan there is much of interest in the medical affairs of the pioneer French explorers and the Indians. In Chapters ii and iii of this book Dr. Burr reviews the available records. Considerable is known of Indian medicine partly from the pioneer settlers and partly from subsequent scientific investigations. It is curious to find that the Michigan Indians practiced trephining just as similar operations were performed by the aborigines of Peru, the South Sea Islands, and elsewhere throughout the world. The French explorers were in many instances accompanied by surgeons and Dr. Burr gives interesting details of their experiences. One of them, Liotot, murdered the Sieur Moranget, La Salle's nephew, with an axe in the course of La Salle's expedition to Louisiana in 1687. Later Liotot was himself murdered in a dispute with another member of the expedition. In the next chapter Dr. Burr tells of some physicians who practiced, chiefly as surgeons, to the Fort at Detroit. These were French until 1760 when the English took over the Fort and settlement. When the United States occupied Detroit in 1796 the surgeons at the post were for many years the chief physicians in the town.

A United States army surgeon, William Beaumont, won immortal fame at Mackinac in 1822, when he was acute enough to grasp the opportunity afforded by a gastric fistula following a gunshot wound in the side of a voyageur, and studied the physiology of the gastric digestion. There are many pages devoted to the pioneer physicians, their hardships and experiences. One of the most interesting chapters is that by Dr. J. H. Dempster on "Medical Education." The first medical college in Michigan was the University of Michigan Medical School, founded in 1850, and now one of the great medical schools in the United States. Dr. Walter H. Sawyer presents a valuable contribution on "Medical Journalism." The subject of "Prevailing Diseases and Epidemics" is well covered by Dr. C. B. Burr, and the volume concludes with an excellent summary of "Public Health Work in Michigan" by Dr. Guy L. Kiefer.

The book is copiously illustrated with well-chosen pictures. It is a pity that so large a volume, 829 pages, should not contain an index. We suppose that one will be provided in a future volume, but it would have been more convenient had it been placed in this one.

FRANCIS R. PACKARD.

KÖLNER ANGLISTISCHE ARBEITEN. Herausgegeben von Herbert Schöffler, 10 Band. AUS MITTELENGLISCHEN MEDIZINTEXTEN Die Prosarezepte des Stockholmer Miszellankodex. Von Dr. Gottfried Müller. Leipzig, Verlag von Bernhard Tauchnitz, 1929.

In this ambitious book Dr. Gottfried Müller has transcribed and edited a little known middle English medical manuscript now in the Royal Library of Stockholm. It once belonged to Christian Raue (Ravius) of Berlin, a noted philologist and manuscript collector who in 1648 was Fellow of Magdalen College, in 1650 Professor of Oriental Studies in Upsala, and afterwards librarian in Stockholm.

The character of the writing in the manuscript shows that four different persons took part in its composition. Marginal notes are by a modern hand. Fixing the date of the manuscript is a difficult matter. On page 80 it speaks of "bokes of fysik and ek bokys of skole of sallerne wrot to þe countesse of henaunde and sche sente þe copy to hyre dowter phelyp quen of Ingelond." The reference is evidently to Phillipa, the daughter of Count William of Holland and Hennegau who became the wife of Edward III of England. However, paleologic and linguistic features make it improbable that the manuscript was composed in the fourteenth century; it is more reasonable to ascribe it to the early and middle of the fifteenth century.

The text consists of recipes in prose and verse, herbals, materia medica in rhyme, and a treatise on urine and venesection. Although the source of the remedies and prescriptions cannot be accurately determined, it is not likely that they are taken from a single middle

English or Latin work. In all probability they were copied from a variety of authorities (English, Latin, [Salernitan] and French). Müller agrees with Schöffler that Payne's view that there is a connection between middle English medicine and the Anglo-Saxon Leech Book is not tenable. John of Gaddesden's "Rosa Anglica" (1314) and the "Compendium medicinae" of Gilbertus Anglicus were used as sources by the writers. The manuscript on the whole is quite free of indigenous folk medicine; a strong Arabic influence is easily traceable.

The first recipe is one for making alcohol. Rendered freely, the directions are as follows:

> For to makyn aqua vite.
>
> Fill a bottle of old red wine and do therein powder of canell, gyllofre, ginger, nutmeg, spikenard, long pepper, black pepper, caraway, fenell-seed, parsley, sage, mint, rue, calamint, horehound and several others—all these powders put then into the wine and do it into a stillatory (retort) and distill with a soft fire and have look that the stillatory be well-closed, so that no fumes may get out and order the fire of good coal. This is clept water of life and may be likened and put instead of natural balm for it has all the qualities of kind balm and all the virtues thereof. The old philosophers called it the second balm. This water is clearer and lighter than water of rose for it will float above all liquors for though oil be poured upon this water anon it seekes the ground and if there be put in some fish or flesh, it may be kept as long as man will without rotting for no manner of thing that is put therein may rotten for this water of life draweth out the sweetness and the savour of all manner of spices and all manner of roots that be put therein.
>
> It is good for all manner of cold sickness and namely for the palsy and it helpeth for the quakings of the gout. It also openeth man's lust that he shall be better therein. It cleareth man's sight.

The foregoing is an illustration of many prescriptions that are given in this work. The majority are fairly sensible and rational; only a few betoken the medieval trust in charms, as for example the following:

> Here beginneth a charm for staunching blood. First it behooves us to know the man's name, then go there to church and say his charm and that thou say it be for man or woman *In nomine patris et cetera.* When our Lord was down on the cross, then came Longeus Thedyr and smote him by a spear on the side. Blood and water came out of the wound. He wiped his eyes and anon he saw rightly through the virtue of that God. Therefore I conjure the blood that thou come not out of this Christian man or woman. *In nomine patris et filii et cetera.* And this charm say three times and then thou need (?) not reckon where the man be or the woman so that thou know the name.

Some might wonder why scholars devote their time to the study of such forgotten lore as this old medieval text. Is it not, however, interesting to know that many of our vegetable remedies hark back to the so-called Dark Ages, and have a very ancient and unbroken lineage? We are apt to forget our debt to the past, especially now when most of our medicinal preparations are of synthetic origin.

DAVID RIESMAN.

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